Towards better regulation of emerging technologies: Three contributions from the Netherlands to the SEBEROC-project on nanomaterials and GM products

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Three contributions from the Netherlands to the SEBEROC-project on nanomaterials and GM products

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1 Introduction

This document contains three contributions to the international SEBEROC-project, made in 2011 by Elizabeth Vogelezang- Stoute and Joop de Boer.

SEBEROC stands for 'Simulating and Evaluating a Better Regulation of Converging Technologies'. This multiyear project, which started in 2010, is carried out by researchers of five countries (Germany, United Kingdom, Finland, Austria and the Netherlands) on behalf of the SKEP-Network.[1] The SEBEROC-project aims at applying the 'Better Regulation' approach to the regulation of nanotechnology and genetic engineering. The project carries out a retrospective regulatory impact assessment in the field of genetic engineering and a prospective regulatory impact assessment in the field of nanotechnology.

In the first phase of the SEBEROC-project three steps can be distinguished at the national levels: an analysis of national specifics regarding nanomaterials and genetically modified organisms (GMOs)(step 1), interviews with stakeholders in the fields of nanomaterials and GMOs (step 2) and focus groups with consumers (step 3). The reports of these three steps, as carried out in the Netherlands, are presented in this document.

The international proceedings of the project, integrating the projects in all five countries, are reported at: **www.seberoc.info.** The project will continue and will be finalised in 2012.

[1] www.SKEP-network.EU. SKEP stands for: Scientific Knowledge for Environmental Protection. SKEP is a partnership of government environment ministries and environmental protection agencies.

2 Overview of National NANO and GMO Specifics in the Netherlands

2.1 Introduction

The Eurobarometer on Biotechnology shows big differences between European countries in their awareness and views about nanotechnology. Compared to the other countries in the SEBEROC research project the Netherlands more or less takes a middle position regarding the question whether nanotechnology should be encouraged.

Table 1. Public opinion on nanotechnology

Question. And now thinking about nanotechnology: Nanotechnology involves working with atoms and molecules to make new particles that are used in cosmetics to make better anti-aging creams, suntan oils for better protection against skin cancer and cleaning fluids to make the home more hygienic. Despite these benefits, some scientists are concerned about the unknown and possibly negative effects of nano particles in the body and in the environment.

For each of the following statements regarding nanotechnology please tell me if you agree or disagree with it: Nanotechnology should be encouraged

	Finland	United Kingdom	The Netherlands	Germany	Austria
Totally agree	17%	10%	10%	13%	6%
Tend to agree	47%	29%	31%	33%	27%
Tend to disagree	13%	16%	25%	19%	22%
Totally disagree	5%	6%	10%	10%	14%
Don't know	17%	40%	23%	25%	30%

Source: Special Eurobarometer 341 "Biotechnology", 2010.

When considering whether nanotechnology is good for them or not, The Netherlands is among the four countries with the highest levels of disagreement with the statement that nanotechnology is not good for them (50%). At the same time the Netherlands is among the countries where a high percentage is uncertain about potential harm to the environment (44%) (Eurobarometer 2010).

With regard to GM food the Netherlands takes a middle position compared to the other countries in the SEBEROC project, with 63% considering that its development should not be encouraged.

Table 2. Public opinion on genetic modification

Question. Let's speak now about genetically modified (GM) food made from plants or micro-organisms that have been changed by altering their genes. For example a plant might have its genes modified to make it resistant to a particular plant disease, to improve its food quality or to help it grow faster.

For each of the following issues regarding GM food please tell me if you agree or disagree with it:
The development of GM food should be encouraged

	Finland	United Kingdom	The Netherlands	Germany	Austria
Totally agree	8%	7%	7%	4%	4%
Tend to agree	20%	28%	21%	16%	17%
Tend to disagree	31%	27%	38%	27%	25%
Totally disagree	33%	18%	25%	45%	45%
Don't know	9%	20%	10%	8%	9%

Source: Special Eurobarometer 341 "Biotechnology", 2010.

When considering whether GM food does harm to the environment, the Netherlands also seems to take a middle position, with 53% not agreeing with the statement that GM food does no harm to the environment and 25% being uncertain about that statement (Eurobarometer 2010, p. 30-32.)

One of the most remarkable characteristics of the situation in the Netherlands is that a relatively large percentage of the public does not only trust consumer organisations (65%) and universities (46%) as sources of information, but also national government bodies (31%, see Table 3). In contrast, the public in several other countries has even slightly more trust in international institutions than in national government bodies. Trust in environmental organizations (35%) is in the Netherlands relatively moderate.

Table 3. Trust in sources of information.

QB11b Now I would like to ask you which of the following sources of information, if any, you trust to tell you the truth about modern biotechnology. (Multiple answers possible) (Eurobarometer 64.3, fieldwork in 2005).

	Finland	United Kingdom	The Netherlands	Germany	Austria
Consumer organizations	30%	27%	65%	68%	43%
The medical profession	49%	31%	38%	35%	50%
Environmental organizations	28%	33%	35%	50%	44%
Universities	47%	25%	46%	37%	27%
Television and newspapers	19%	14%	17%	19%	12%
International institutions (not companies)	12%	13%	23%	20%	12%
National government bodies	14%	11%	31%	14%	8%
Industry	8%	4%	6%	2%	3%
None of these (spontaneous)	5%	10%	5%	6%	9%
N	509	678	496	782	479

2.2 Regulatory framework, specifics in the Netherlands

2.2.1 GMO regulatory framework

In the Netherlands, provisions for the use GMOs are laid down in a GMO Decree and a Ministerial Regulation based on the General Environmental Management Act (Besluit genetisch gemodificeerde organismen milieubeheer en Regeling genetisch gemodificeerde organismen). Directive 2001/18/EC (on the deliberate release of GMOs into the environment) and Directive 2009/41/EC (on the contained use of GMOs) are implemented in these regulations. There is a permit system for contained use and for the introduction into the environment of GMOs. On behalf of the Minister of Infrastructure and the Environment, the GMO Bureau (Bureau GGM) of the RIVM, carries out the permit system.

Field trials are being conducted regularly and there is an extensive case law of the Administrative Court of the Dutch Council of State (more than 50 cases) concerning these field trials (for maize,

potatoes, apple trees, poplars and rapeseed). Many permit decisions were annulled by the Court, often because of a lack of information about the locations of the trial, but also because of risk assessment and permit procedures.[2]

Although GM crops are not commercially cultivated in the Netherlands, a **voluntary agreement on coexistence** guidelines was developed by the relevant parties in 2004 and an experiment was carried out in 2006 and 2007 to test isolation distances.[3]

Compared to some other Member States, the Netherlands has very strict conditions for the use of the **label 'bereid zonder gentechniek'(produced without gene technology)**. Since 1999 these conditions are laid down in the 'Commodities Act Decree on novel foods' (art. 3a).[4] The label is only allowed for food and drink commodities which:

- do not exist of, or are not derived from GMOs, and
- are not prepared with substances which exist of, or are derived from GMOs, or which are produced with ancillary process materials derived from GMOs;
- are not derived from animals fed with GM feed or feed containing GM additives, or animals which had drugs produced with modern biotechnology, unless alternative drugs do not exist; neither from animals with traces of DNA unless this is adventitious and technically unavoidable.

Documents are required to prove that the requirements are fulfilled (art. 3a section 1 and 2). Other labels (e.g. 'GMO-free') are explicitly *not* allowed (art. 3a section 3).[5] The label 'produced without gene technology' is incidentally spotted.[6] No governmental or self regulating activities have been developed to apply this 'produced without gene technique' label.[7] Although there is no specific legislation about the discretionary power of Member States on this aspect, the Dutch legislator assumes that within EU legislation Member States have room to lay down these specific rules for products made without gene technology.[8]

In 2009 and 2010 a discussion took place in the form of litigation, between Greenpeace Netherlands and the Dutch Minister of Agriculture, about **the interpretation of the 0,9% contamination threshold** in Regulations 1829/2003 and 1830/2003. The interpretation of the Minister until then had

[2] For an evaluation of the court cases see: Somsen, 2010 (in Dutch). In many cases NGOs are an appellant party.
[3] Coëxistentie gg-gewassen, conventionele en biologische gewassen, *Kamerstukken* II 2004/05, 29 404, nr. 6.
[4] Warenwetbesluit Nieuwe Voedingsmiddelen 29 April 1997 (amended). The Decree is based on Directive 258/97 and on the regulations 1829/2003 and 1830/2003. In 2000 politicians and stakeholder organisations stated that these requirements can hardly be applied because of their strictness (De Vriend, ongedateerd).(H.C. de Vriend, *GGO-vrije additieven en hulpstoffen voor biologische (dier-)voeding*, ongedateerd,p.9 (www.lisconsult.nl).
[5] A general labelling Decree prohibits the use of this specific labelling in a situation where all products are produced without gene technique (Warenwetbesluit etikettering van levensmiddelen, Art. 29 section 2).
[6] An example are the organic products of Taifun, Life Food (Freiburg) with a 'bereid zonder gentechniek' label and referring to: www.taifun-tofu.com.
[7] In the explanatory memorandum of the above mentioned Decree the application of such a scheme, e.g. a certification system, is left to the market. In the conventional agriculture some initiatives were started to have a chain free from GMO, but these initiatives did not continue (e.g. Kwetters eggs).
[8] The explanatory memorandum of the Decree (Warenwetbesluit Nieuwe voedingsmiddelen), p. 3, refers to the repealed regulation 1139/98 (preliminary considerations no. 20), where discretionary power for the Member State on this subject is explicitly mentioned and is not considered to be conflicting with regulation 258/97/EC.

been rather broad. In the appeals phase before a Dutch administrative court the Minister of Agriculture replaced an earlier decision by a new decision, admitting that the contamination up to 0,9% is only permitted when the contamination is not 'unadventitious or technically unavoidable'.[9] This means that these conditions have to be weighed.

2.2.2 Nano regulatory framework

There are no specific regulations or provisions on nanomaterials in the Netherlands. Although several advisory councils concluded that there should be some form of regulation of the marketing of nanomaterials (e.g. VWA 2008), to date no national regulatory initiatives have been taken.

In 2009 three ministries (environment, public health and social affairs) commissioned an extensive research project concerning the appropriateness of existing legislation for regulating nanomaterials. The study, conducted by the University of Amsterdam, analyses possibilities and bottlenecks for regulating uncertain risks of nanomaterials in the fields of environmental protection, consumer protection and safety at work, at the EU and national level (Vogelezang-Stoute et al. 2010).

> A central research question of this study was what regulatory powers authorities have to regulate the production, marketing, use and the waste phase of nanomaterials (e.g. to require notification, delivery of data, labeling or to take restricting measures) and what obligations industry and employers have. The study identifies many gaps and obstacles for regulating nanomaterials in the existing EU and national legislation. One of the conclusions of the study is that Member States do have discretionary powers to take national measures as long as EU legislation does not exhaustively or effectively regulate the marketing and use of nanomaterials.

Beginning 2011, in a policy letter to Parliament, concerning the national strategy for handling uncertain risks of nanomaterials, the ministers refer to this study as an element of this strategy. No regulatory action was taken, however. On the one hand there is a growing support for national measures, such as notification, because of the slow progress in EU regulatory developments. On the other hand, the ministers still prefer an EU approach and therefore refer to the coming EU Environment Council, June 2011, for steps to be taken (Policy letter, 2011).

> Dutch authorities have urged the Commission to come with a definition before the mid 2011 meeting and to conclude the three REACH (RIP) projects. The Dutch authority is preparing the evaluation of a nanomaterial under REACH (not to start until 2012 however (ChemicalWatch, 9-3-2011).

Parliament, however, requires action, insisting on a notification scheme for nanomaterials. The discussion between Parliament and the ministers, about a notification scheme, is to be continued (Report Parliamentary meeting, 2011). Although the sharing of information is a central theme in the

[9] Ministry of Agriculture, May 18 2010, DRR&R/2010/4101.

government strategy, the ministers conclude, in a letter to Parliament, that attempts have failed to attain a covenant with industry to share nano information (Policy letter, 2011). To date in the Netherlands there are no covenants or other voluntary agreements in the field of marketing and use of nanomaterials.

2.3 The market for GMO food and feed/GM soy and nanomaterials/nanosilver

2.3.1 General market situation GM food and feed, especially soy

No soy is commercially cultivated in the Netherlands. The Netherlands is one of the biggest importers of soy beans and soybean oil (FAOStat 2011). Much of this is for feed in the intensive farming industry. According to a calculation for soy in the Netherlands, in 2008 and 2009 yearly a total of 1.8 mln tonnes of soy products are consumed in livestock feed and 0.13 mln tonnes (primarily oil) in human and technical applications. The total area of cultivated land required to produce this quantity of soy is approximately 700,000 ha. Around 80-90% of the soy import comes from South America. Part of the soy import (beans, meal and oil) is directly shipped to other countries. Part of the soy which is processed in the Netherlands is also exported. The soy is used for livestock feed and in human (food) products and technical applications (Hoste en Bolhuis 2010). Another source calculates that the processing of soy for food and feed is 3,3 mln tonnes in 2008, some of which is exported. Only 4% of this is categorised as 'responsible', which, among other things, means this is GM free (Soja Barometer 2009).[10]

GM soy in food products: Specific for the Netherlands is that several products labelled as 'geproduceerd met genetisch gemodificeerde sojaolie'(produced with GM soy oil) are on the market, such as: salad oil and margarine from GM soy beans. The GMO compass mentions the Netherlands as a notable exception for products with a GM label.[11]

There is no public register of these products. According to Greenpeace some 17 GM labelled food products (mainly based on GM soy oil and GM maize ((crisps) are available in supermarkets.[12] The number of GM products dropped after the GMO labelling requirements became applicable, in 2004. The GM labelled products seem to be the cheaper products within their segment.

[10] Standards of ProTerra biologisch and EcoSocial are used.
[11] www.gmo-compass.org/eng/regulation/labelling/. The site shows several illustrations of GM labeled products.
[12] www.greenpeace.nl/campaigns/gentech/waar-vind-je-gentech.

2.3.2 General market situation nanomaterials

As far as we know there are no statistics or calculations publicly available about production, handling, import or export of nanomaterials in the Netherlands. Nanotechnology is one of the high tech priorities of the Dutch government and industry. There are ambitious Research & Development and innovation programmes. An example is NanoNed, a network of universities, TNO and Philips.[13]

Nano particles in consumer products: There is no database of marketed nano-products. The following three reports give some idea about nano (claims) in certain product categories on the Dutch market:

> 2009: Inventory of consumer products (non food) with a nano-claim: 120 products, of which: cosmetics 70; cleaning and maintenance 45; other (textiles, lunchbox) 5. Surveyed market segments: cosmetics, cleaning products, textiles, food contact materials, biocides (VWA 2010.
>
> 2007: Inventory of consumer products (non food) with nano-claim: 120 products (main categories: cleaning products, cosmetics, clothing). Surveyed market segments: kitchen and bathroom appliances, electronics, home furnishing & household products, motor vehicles, food packaging, personal care & cosmetics, health, sporting goods, textile, toys & games, cross-cutting, miscellaneous (RIVM 2007a).
>
> 2007: Inventory of nanomaterials (NMs) in the food chain, **not** specific Dutch market: among other products: pesticides, food processing and storage and food packaging (RIVM 2007b). Some 10 applications of nano-silver in food processing and storage were identified.

In 2010 a debate took place between the Dutch Consumer Organisation (Consumentenbond) and the Dutch Food Industry Association about nanosilica in food products, such as coffee creamers.[14] A study of the government research institute for public health and the environment, RIVM, brought this on the public agenda (RIVM 2010). New research results are expected in 2011.

Nano-silver products on the Dutch market: A 2009 inventory identifies the following product categories: cosmetics and personal care: 4, textiles: 3, food packaging box: 1 product. Products mentioned are: Nano-Silver hand sanitizer, Nivea anti-transpirant Silver protect 24h, tooth brush Aquafresh, X socks air force 1 silver, Trekking TK short coll (sportswear), Odlo sports underwear windproof shirt, Crystal colloidal silver (cosmetics), Freshbox, nanosilver food container.[15]

In 2010 and 2011 several supermarkets/warehouses sell socks labelled as: 'Feel Fresh, antibacterial finish, helping your feet feeling fresh and odourless'.

According to several detailed surveys on opinions of consumers regarding nanotechnology and nanoproducts, the awareness and the opinions of consumers about nanomaterials depend on the product category and the products. E.g. for personal care products eight out of ten respondents do not know whether they use products with nanomaterials (n = 481). The advantage of nano-anti-

[13] In 2009 e.g. € 125 million was granted to the programme 'Towards a sustainable open innovation ecosystem' (new applications for nano- and microtechnology); € 28 million to NanoLabNL and € 12 million to CAT-AgroFood Wageningen. In the period 2006-2012 the Innovation Programme Point One was granted € 343 million. A nanotech multi annual programme is NanoNed (€ 95 million), 2005-2010). See: www.rijksoverheid.nl/onderwerpen/nanotechnologie ('investeren in onderzoek').

[14] See:http://www.consumentenbond.nl/actueel/nieuws/nieuwsoverzicht-2010/duidelijkheid-over-nanodeeltjes-snel-nodig.

[15] Several of these products do not have an explicit nano claim.

wrinkle cream is the best known, advantage of nano toothpaste is the least well known. Of the respondents 21% is positive about further development of nano personal care products. In an earlier survey this was 28%. For food products: nine out of ten respondents do not know whether they use food for which nanotechnology is used (n = 517) (Nanopodium 2010, p. 45-51).

2.4 Political developments and debates and the role of national stakeholders

2.4.1 National Policy Developments and Debates GM

In the Netherlands, there has been a public debate about GM in the year 2002. This debate, organized by the Terlouw Commission, was criticized by several NGOs, including Greenpeace, because it did not address the fundamental question whether gene technology is desirable and necessary at all. Several later attempts to put this question on the political agenda were not successful. At a recent meeting, organized by the Dutch Minister of Agriculture, the Minister mentioned that, in her opinion, the question "do we want GMOs?" was no longer relevant, because many GMOs are used already in feed, cotton and other products (NRC Handelsblad, June 10, 2009).

In 2010/2011, there is not much national debate. This does not mean there are no developments. In **Parliament** the authorisation of the Amflora potato raised some discussion in 2010 (Parliamentary letter 25-5-2010).

At the **policy and advice level** the GMO advisory commission for the government (COGEM) in 2010 published an important report 'Geboeid door keuzevrijheid', about developments regarding freedom of choice in relation to GMOs. Five labelling scenarios are sketched: 1. obligatory positive labelling (current situation), 2. voluntary negative labelling (GMO free), 3. pollution label (traces of GMOs), 4. restructuring the label information and 5. framing labelling in another way (COGEM 2010, in Dutch).

In 2009 the COGEM published the report '*Should EU Legislation Be Updated; Scientific developments throw new light on the process and product approaches'*. A conclusion is that the GMO legislation is no longer in step with scientific developments in plant biology. As a result it is no longer clear what should be considered to be a GMO. The 'process based' EU legislation creates an uneven playing field compared to the US system, and undermines consumer choices. This calls for a rethink of the EU legislation, according to the COGEM conclusions (CGM/090626-03).

As far as the **caselaw** concerns, after several successes in the years before, in 2010 Greenpeace and the organic farmer's association lost a court case against the minister of the Environment about field trials.

> According to the Administrative Court the permit meets the requirements of Directive 2001/18. The risk for the organic farmers for contamination (cross breeding) did not have to be taken into account in the decision for the permit for category 2 and category 3 field trials, the Court argued (ABRvS 28 April 2010, 200802711/1M1).

According to this decision less information for third parties will be required about the field trials.

2.4.2 National Policy Developments and Debates Nano

Nano Government policy and Parliament

Since 2007 the government has laid down its policy on nanotechnology in a Cabinets vision on nanotechnologies (Kabinetsvisie Nanotechnologie 2007), an Action Plan Nanotechnology (Actieplan Nanotechnologie 2008), and several policy letters to Parliament (e.g. Policy letter 2008). Via subsidy schemes Research and Development and Innovation are stimulated (Actionplan nanotechnology, progress report).

In 2009 Parliamentary resolutions required the government to:

- accelerate the development of risk analysis of nanomaterials,
- introduce a notification obligation for the use of nanomaterials, and
- develop nano reference standards for industry (see RIVM 2010b).

In the meantime the government has announced that a minimum of 15% of the nano research budget will be used for nano risk research (Policy letter 2011). One of the government actions was the founding of a 'Kennis- en Informatiepunt risico's nanotechnologie' (Knowledge and Information Point for nanotechnology risks) within the RIVM.[16] Interim nano reference standards have been developed in 2010. Further research is being done on these standards (Dekkers 2010).

The government policy on notification is to try to establish a notification scheme at the EU level (Policy letters 2009 and 2010. The EU Environment Council in June 2011 will discuss this issue. However, options for regulatory action at the national level are being considered in case the EU route might take too much time (Policy letter 2011, p. 7-8).

Nano Advisory councils

Advisory reports of the Health council, the Social and economic council, and the Office for risk assessment (food and products), all recommended a precautionary approach for the marketing and use of nanomaterials:

- The Health Council of the Netherlands concluded that investigation of toxicological properties of not readily degradable or dissolvable nanoparticles should be done before mass production and marketing (Gezondheidsraad 2006).
- The Social and Economic Council had as main conclusions that the employer bears main responsibility and that substances with uncertain or unknown risks – including nanoparticles – should be treated as hazardous (or extremely hazardous) substances. Policy and implementation measures should focus on preventing or minimizing exposure of employees (SER 2009).
- The Risk assessment office of the Food and Consumer Safety Product Authority in 2008 recommends that notification of the presence of nanomaterials should be required VWA 2008). For food products

[16] http://www.rivm.nl/rvs/075_nanotechnogie/KIR_nano/. The tasks of KIR nano are to identify risks, to advise and inform ministries and parliament and to participate in international and EU committees.

one of the recommendations is that food products with deliberately produced nanomaterials should be treated as novel products VWA 2010).

Nano dialogues and consultation platforms

Since 2003 the *Rathenau Institute*, an institute for research and debate on science and technology, works on stimulating a dialogue about nanotechnology, between science, government, industry and community. One of its publications, based on workshops with Dutch NGOs is 'Ten lessons for a nanodialogue' (2008). One of the Rathenau activities was to prepare materials for round tables for parliamentary commissions in 2009 (Rathenau 2009).

In 2009 a survey under 550 consumers showed that 58% of the respondents had never heard of nanotechnology (LVN Consumentenplatform 2009).

In 2009 and 2010 a big 'Nanodialogue' took place, organised by the Commission Societal Dialogue Nanotechnology. This raised quite a lot of publicity and debate. Many events were organised, projects were subsidised and surveys carried out (Nanopodium 2011). Many different activities were financed (nano cafés, dialogues, websites, television, school projects and other educational and communication projects). Next to NGOs, such as WECF (project: Nano in the babyroom) and the Society for Nature and Environment, universities, churches and other organizations participated). The Commission uses the 'virtual arena' NanoPodium (www.nanopodium.nl) for all the activities (Tussenrapportage, 2010). One of the results of the activities seems to be that nanomaterials have been in the news quite often in 2010 and that awareness has grown in the general public. In 2009 54% had heard of nanomaterials, in 2010 this was 64% (Nanopodium 2009 and 2010).

Research results about nanomaterials in food products (RIVM 2010) also contributed to bringing nanomaterials in the media and on the public agenda.

Nano Voluntary codes

In the *Consultative group of nano stakeholders* of the ministry of the Environment (Klankbordgroep nanorisico's), in which representatives of NGOs (environment and consumer organisations and business and industry organisations) participate, one of the discussion points is a covenant about sharing information about (risks of) nanomaterials. However, in the 2011 policy letter the Minister concludes a covenant could not be attained due to restraint regarding sharing confidential information (Policy letter, 2011).

In 2010 opinions and experiences of CSOs (civil society organisations) with voluntary codes, measures and practices were investigated. This project aimed at developing a framework to support the successful integration and implementation of an EU Code of Conduct (CoC) for nanosciences and nanotechnologies, as proposed by the European Commission in 2008 (http://www.nanocode.eu). The report of this project contains some interesting observations:

- The multi stakeholder dialogue workshop could not be held because of lack of cooperation. Some CSOs did not have time, others lacked confidence in the democratic character of current policy making, or it was not seen as clear how the results would be used. Therefore, instead of the workshop telephone interviews were held.

- The major environmental organizations in the Netherlands, like Greenpeace and Friends of the Earth have not been approached because these organisations neither issued position statements of press briefings on nanosciences and nanotechnologies, nor participated in the multi-stakeholder dialogue Nanopodium.

The views of the participating CSO varied on the different aspects, but all CSOs shared and stressed the viewpoint that a voluntary CoC should not replace legally binding safety regulations for nano research and applications (Schenkelaars and De Vriend 2010).

2.5 National stakeholders

2.5.1 Stakeholders GM

Among the stakeholders that play a role in the national GM debate are:

- CSOs: Greenpeace Netherlands; Soy coalition.
- Interest organisations: Dutch farmers organisation LTO; organic farmers organisation BIOLOGICA; biotech industry association NIABA; Dutch Food Industry federation FNLI; CAMPINA (international dairy company).
- Authorities: Commissie Genetische Modificatie (COGEM, advisory commission for genetic modification), several government ministries, Bureau Genetisch gemodificeerde organismen (Office for GMOs; permits for contained use and for field trials).
- Research institutes, consultancies etc.

2.5.2 Stakeholders Nano

Among the stakeholders that play a role in the national nano debate are:

- CSOs: Stichting Natuur en Milieu (Foundation for Nature and Environment), Vereniging Leefmilieu (Urban Living Environment), WECF (Woman in Europe for a common future, project: 'Nano in the babyroom'),Consumentenbond (Consumers organization), Trade Union federation.

- Interest organisations: Cosmetics Industry, Food Industry, Chemical Industry.
- Authorities: several ministries, including Inspectorates.
- Research institutes, RIVM, consultancies etc.

See for a mix of authorities, research and businesses e.g.: NanoNextNL, a consortium in which the ministry of Economic Affairs and around 100 businesses, universities and research centra are working together, and which has a big subsidised research programme (www.nanoned.nl).

2.6 Summary and conclusions

The following aspects might be considered as specific for the Netherlands.

GMOs, regulatory framework, market situation, policy and debate:

- very strict conditions for the label 'produced without gene technology'; the label seems only incidentally used;
- the label 'containing GM soy' is used on several products in several supermarkets;
- an interpretation of the 0.9% contamination threshold was given by the minister as a result of a court case;
- the court cases about the field trial permits improved decision making and resulted in, amongst other things, more information about the location of the fields; it is not clear how this will continue;
- a voluntary coexistence agreement is established, although no GM crops are commercially cultivated;
- The labelling system of GMOs is questioned and new labelling scenarios are explored by the GMO Commission;
- there are only a few NGOs active in this field;
- there is little public debate about GMOs.

Nanomaterials, regulatory framework, market situation, policy and debate:

- no regulatory setting for the production and marketing of nanomaterials; no notification, no labelling or other regulatory measures; no covenants;
- parliament asks for a notification scheme; government waits for an EU approach; discussion continues;
- lack of information about use in products: government and consumers are not informed about products and market situation;
- research results show the present legal system is not adequate; potential risks are not covered by the current EU and national legal system;
- debate is stimulated, CSOs have been carrying out projects, research is conducted, but no regulatory action is taken to date.

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3 Conclusions of the NANO and GMO interviews in the Netherlands

3.1 Introduction

This section gives an overview of the results of the telephone interviews with representatives of NGOs (non- governmental organisations), interest organisations and other relevant experts in the Netherlands. The interviews were conducted in the autumn of 2010. They were based on a Dutch translation of the two SEBEROC questionnaires about nanomaterials and GMOs, respectively. The answers to some introductory questions regarding the position of the interviewees are not reported here.

3.2 Nanomaterials: overview per question

Interviewees: NGO Stichting Natuur en Milieu, NGO Vereniging Leefmilieu , NGO Women in Europe for a Common Future, NGO Consumentenbond (Consumer organisation), Nederlandse Cosmeticavereniging (Dutch Cosmetics Industry Association), NFLI (Dutch Food Industry Federation), VNCI (Chemicals Industry Association), VNO-NCW (Industry and Employers Confederation), RND (Retail Council), Researcher Nanocap project.

Main concerns regarding nanomaterials? (question 4)

- Much information is lacking. Can use be justified? Companies do not give information about the products they bring on the market.
- Concerns depend on product: route through drain to sewage (nanosilver); exposure skin and inhaling (cosmetics).
- Environmental concerns: nanosilver ends up in water sewage treatment. Persistent particles. Inhalation carbon nanotubes car tires.
- Main concern: lack of data and growing market. Waste phase. Exposure babies (WECF, env. organisation.).
- Safety.
- Biggest concern is consumers losing faith in a safe use.
- For higher or new exposure safety has to be guaranteed on the basis of research.
- Uncertainty impacts, especially certain fibre structures.
- Life cycle, waste water.
- Lack of sufficient information about possible negative effects and unclear viewpoint government.

Nearly all the interviewees mention the lack of information and the uncertainty as a main concern. Consumers losing faith in safe use and unclear government policy are also mentioned.

Ranking risks for health or environment, relating to product groups? (question 5)

- Risks depend on the nanomaterial and exposure, in combination with the way industry handles it (cosmetics industry e.g. will be careful). In general: use of silver for disinfection is wrong; bactericides have a function.
- Ranking is problematic, also depends on exposure. Ranking not possible.
- Ranking is problematic, also depends on whether there is regulation; Biocides are meant to have harmful effect, but are regulated. Food products high risk, but maybe less in practice.
- 1. Food, 2 Cosmetics, 3 Textiles, 4. Biocides (residues), 5. Washing machines, coatings (however: waste problem).
- Question not properly phrased. Depends on specific application.
- Nonsense question. Too general. Risks depend on application.
- 1. Biocides/pesticides; 2. White goods. 3. Packaging material. 4. Drugs. 5. Food .
- Depends on type of material: asbestos like fibres are different from sliciumdioxides. Biocides and pesticides maybe first.
- Difference real risk and perception of risks; depends on assessment criteria (strict for biocides, but textiles not regulated in same way). Also depends on type of nanoparticle. Important: risks from e.g. China.
- Ranking not possible. Consumers concerned about products close to body (food, cosmetics, textiles).

The question is criticized. Most of the interviewees have problems with this 'ranking', because the risks depend on, among other things, the exposure, the kind of regulation and the type of material. It is mentioned that consumers will be most concerned about products used close to the body.

Comparison of nanosilver with other nanomaterials: are products with other nano components (SiO_2 or TiO_2) more important for you work because of potential harms to health/environment? (No. 6)

- Comparison with other nanomaterials does not work. Case by case assessment is necessary. Medical treatment appropriate.
- Weighing of different items is not possible.
- Depends on the application. Is it encapsulated? Titaniumdioxide is rather encapsulated. Worrying is that particles can be inhalated and can enter the brain.
- Potential harms are a matter for research institutes. Depends on type of material and on exposure. Data titaniumdioxide only for LÓréal.
- Biggest risk: persistent nanoparticles, carbon nanotubes, nanosilica in food. Risks are uncertain, cannot be assessed.
- Question is not correct. SiO_2 and TiO_2 are more often used in cosmetics than silver, so are used by more consumers.
- Question has to be based on research. Products have to be safe. Depends on safety measures.
- Potential harm: depends on the form of the silver, sometimes soluable. More concerns about carbon nanotubes or bucky balls.
- Potential harms: matter for research institutes.
- Products have to be safe. Safety information is important.

The requested comparison is seen as problematic. Comparison should be done case by case, depending on the application and the form of the nanomaterial (e.g. encapsulated). Comparison is seen as a matter for research institutes.

In your perception: any risks related to nano silver? If yes, which? (no. 7)

- Negative effects for the environment.
- Research reports show concerns; difficult to say how big the risks are .
- Depends on the dose. Nanosilver is especially a concern for the environment; nanosilver in socks; in US regulated as pesticide.
- Impact of nanosilver on sewage water treatment process.
- Question for toxicologists .
- Depends on applications. For current applications risks are negligible and acceptable.
- Anti- bacterial effects could kill good bacteria in sewage treatment plant.
- Risks depend on exposure. When there are unknown risks, reason for precautionary measures, e.g. with washing machines.
- Question for research institute.
- Biggest risk is that we do not yet know the risk.

Several interviewees mention the risk for the sewage water treatment and the surface water. Others refer to the experts. Two interviewees see risks as negligible respectively refer to precautionary measures.

Statement: rules concerning product information nanosilver are sufficient to prevent harm (no. 8)

- Tend to disagree. Harm is not prevented by labeling. Labeling in general is insufficient. Traceability is important when particles can become available.
- Informed but not sure.
- Strongly disagree. There is no information, also according to Inspection). Consumer right to know.
- Strongly disagree.
- Informed but not sure.
- Labeling does not prevent harm.
- Strongly agree .
- Informed but not sure. In principle sufficient. In practice more development rules necessary.
- Strongly agree. Consumer right to know, also when not useful.
- Informed but not sure: Not too much labeling wanted. Labeling is not always the right tool; must be combined with other information. First aim safety, not labeling.

There is a wide variety in the answers about the sufficiency of current rules, from (strong) disagreement to strong agreement . Next to NGOs some interest organisations see the necessity of more rules or stress the consumer right to know. Relation labeling and harm is questioned.

Statement: upcoming EU and national labeling regulation sufficient to prevent harm. (no. 9)

- Tend to disagree; regulation will be insufficient. No definition yet .
- Strongly disagree.
- Tend to disagree. Cosmetics regulation not enough. Otherwise unknown what is coming up.
- Strongly disagree.
- Strongly disagree.
- Strongly agree .
- Strongly agree .
- Tend to agree, however: labeling never sufficient to prevent harm. Important that users adapt their activities on the basis of this labeling.
- Question not correct. Labeling does not prevent harm.
- Informed but not sure.

Views about sufficiency for preventing harm of coming regulation also vary widely, without much reasoning, apart from the lack of definition and the uncertainty about the sort of regulation. NGOs all disagree. The interest organisations either agree or criticize the question because of the relation labeling and harm.

Statement: current product information = informed choice consumers. (no. 10)

- Strongly disagree regarding nano.
- Strongly disagree: 1. not on label or difficult to find; 2. consumer is not informed enough.3. consumer cannot assess risks .
- Strongly disagree. The companies we wrote did not answer; they don't know either.
- Strongly disagree.
- Strongly disagree.
- Tend to agree in general, but not for nano.
- Strongly agree .
- Strongly agree .
- Tend to disagree; depends on product. Label sometimes too small.
- Informed but not sure.

NGOs strongly disagree that current product information would give an informed choice for consumers. Interest organisations vary in their views.

Statement: upcoming EU and national labeling regulation = informed choice consumers. (no. 11)

- Informed but not sure: depending on tailoring to nano aspects.
- Tend to agree for cosmetics, but not for other products.
- No opinion.
- Strongly disagree .
- Tend to agree .
- Tend to agree for cosmetics/Cosmetics Regulation .
- Strongly agree .
- Tend to agree .
- Tend to agree .
- Informed but not sure.

Views about an informed choice in the upcoming labeling regulation vary widely. Two interviewees tend to agree for the Cosmetics Regulation (which is the only established piece of forthcoming legislation).

Statement: Most consumers are not interested in nano related product labeling information (12)

- Tend to agree.
- Informed but not sure.
- Strongly agree, but opinion leaders do want to know.
- Tend to disagree, they are interested but do not have enough knowledge to handle the information.
- Informed but not sure.
- Strongly agree.
- Strongly agree.
- Strongly agree.
- Strongly agree.

- Informed but not sure.

Most interest organisations strongly agree that consumers are not interested in nano related product labeling information. The NGOs have different opinions, stressing that opinion leaders do want information and mentioning the lack of knowledge for many consumers to handle information.

Statement: Consumers' compliance with product information when handling nano-silver products is crucial to prevent harm to health/environment (no. 13)

- Strongly disagree, scandalous statement. Not the consumer but the producer is responsible, e.g. washing socks/nanosilver down drain.
- Strongly disagree; consumer cannot prevent; producer obliged to market product without risks.
- Question not clear; how to comply when there is no information about nano?
- Strongly disagree.
- No opinion.
- Strongly disagree.
- Strongly agree.
- Strongly agree.
- Strongly agree.
- Tend to agree.

This statement about the role of consumers' compliance of nano-silver products in relation to harm, raises much criticism and disagreement of NGOs, because the consumer is not responsible and the question is considered not clear. Three interest organisations strongly agree that compliance is crucial; one interest organisation strongly disagrees.

Statement: Product labeling is generally trustworthy (no. 14)

- Strongly disagree, too little compliance.
- Tend to agree: producers will comply if they have to.
- Tend to agree: true in general, but not for nano.
- Tend to disagree: product labeling is insufficient, see CE label on toys.
- Tend to disagree.
- Strongly agree.
- Strongly agree.
- Tend to agree, more information is needed.
- Informed but not sure: in general trustworthy but for nanomaterials this can be questioned.
- Informed but not sure.

About the statement on product labeling being generally trustworthy, the views of NGOs are very different and the views of interest organisations are also varied. Nanomaterials are mentioned twice as problematic on this point.

Statement: To support regulatory process it is necessary to know more about consumer perceptions (no. 15)

- Depends on the subject. Regulator must make rules which prevent harmful effects.
- Tend to disagree. Regulator should take care that people are not exposed to risks.
- Tend to agree for labeling; but consumer perspective is only one perspective, next to environment, safety at work etc.

- Strongly agree: Europe tends to think it is enough when there is information, so that people can choose. Most consumers cannot choose, so some products should not be marketed.
- Tend to agree.
- Strongly agree.
- Strongly agree.
- Tend to agree, especially for uncertain risks.
- Strongly agree.
- Tend to agree.

Most interviewees agree with this statement that knowledge of consumer perceptions is necessary to support the regulatory process. However, it is also stressed that the government has its own responsibility.

Statement: routines of consumers are sufficient to prevent harm from nanoproducts (no. 16)

- Strongly disagree; nonsense question.
- Strongly disagree; responsibility not with consumer.
- Tend to agree: routine behaviour should be sufficient to prevent harm.
- Strongly disagree; for example waste management.
- Strongly disagree .
- Strongly agree.
- No opinion.
- Tend to agree; if env. risks because of disposal that should be on label.
- Strongly disagree.
- Tend to disagree.

This question, about routines of consumers and the prevention of harm from nanoproducts, raises very different answers, also under the NGOs and under interest organisations, and the different comments, all together give the strong impression this question was not clear.

Question 17: Connection between harm to health/environment and consumer behavior regarding products?

- This could be the case of course; but what is 'consumer behaviour'?
- Of course, behavior determines how substances are emitted in the environment
- Yes, always a connection (dangerous substances down sink).
- Yes, some effect, for example sunscreens and children licking this cream.
- Consumer is not responsible for harm because of nanoparticles.
- Yes, obvious for example use of cigarettes.
- Yes, always possibility of improper use, for example improper disposal; 20% of all food supplies are wasted because of consumer behaviour.
- In general yes, for example alcoholic drinks, cigarettes.
- Yes, disposal, uncontrolled use, wastage, therefore product has to be safe.
- Very general and broad questions. Yes, in general, for example too much textiles are still disposed of as waste.

All interviewees agree on this broad question about a connection between harm and consumer behaviour regarding products.

Statement: In general: Participatory procedures EU level: European NGOs give adequate consideration to national points of view (no. 18)

- No opinion, depends on NGO and on problem: EU interests can be contrary to national ones.
- No opinion.
- Tend to agree; depends on national points of view, but usually taken into account.
- Tend to agree: legitimacy is based on support in society; Some organizations however play a more international role.
- No opinion, too general and unclear question; which national viewpoint: of member state or NGO-members? No information about other EU NGOs.
- Strongly agree: aim is to get consensus.
- Strongly agree: attuning with viewpoints national NGOs and coordination does take place.
- Tend to agree: sometimes problematic for EU NGO, for example when national NGO is ahead of Europe, the EU organisation cannot take this into account at EU level.
- Tend to agree, but depends on the organization goal and structure; some organisations are more Europe oriented .
- Tend to disagree. No viewpoint in general. Retail NGOs try to take into account as much as possible the different viewpoints of countries.

The consideration of EU NGOs to national viewpoints is seen as adequate as far as interviewees refer to their own situation. However, when interviewees interpret the question in general, doubts are mentioned, e.g. that viewpoints can vary too much and that the answer depends on the structure of the organisation.

Statement: European NGOs give adequate consideration to your national points of view on regulatory issues (e.g. labeling) when negotiating at the EU regulatory level (no. 19)

- No opinion, Question cannot be answered in general.
- Strongly agree, experiences are that EU NGOs take into account national NGOs opinions.
- Tend to agree, viewpoints usually taken into account.
- Strongly agree.
- Strongly agree that EUC takes into account viewpoints of our organisation.
- Strongly agree, COLIPA takes our viewpoints into account.
- Strongly agree when one communicates one's viewpoint.
- Tend to disagree: with regulatory matters this is partly other way around: national organisations will take into account the EU organisations viewpoint.
- No opinion, we negotiate ourselves.
- Difference between question 18 and 19 is not clear. Our EU-organisation will try to take our viewpoint into account, but this is not always possible.

When it concerns their own situation and negotiating at the EU regulatory level by EU NGOs, most interviewees agree that national viewpoints are taken into account by EU NGOs. However three commercial organizations argue that their experiences are different: either they negotiate themselves, or the national organisation will follow the EU, or taking into account the national view is not always possible.

Statement: I am satisfied with current labeling scheme (nano products) in my country. (no. 20)

- Strongly disagree, insufficient information about relation to risks and about lack of knowledge.
- No opinion.
- Strongly disagree; even Food and Consumers Authority is not satisfied.
- Strongly disagree; difficult to get informed about substances in a product, even when one actively tries; safety data sheet does not address consumer.
- Strongly disagree: nano does not have to be labeled, so nobody knows.
- Strongly agree: we have been able to establish a system in which consumer can choose.

- Tend to agree for nano, but do not agree in general: too much on the label will have an adverse effect on consumers; with 'nano' on the label not much is explained yet.
- Strongly agree: labeling for chemicals is good.
- Tend to agree, think we are doing well.
- Tend to disagree: the trend is to label too much information.

Most NGOs strongly disagree with the statement about the satisfaction with the current labeling scheme (nanoproducts). They point at the lack of information. The interest organisations agree with the statement. However, from their comments it becomes clear that most of them refer to labeling in general. One organisation refers to the established Cosmetics Regulation.

In case not satisfied: In what particular way would you like to modify the nano labeling scheme and why? (no. 21)

- Reliable risk assessment should be required. If safe use cannot be communicated label should inform about this. I want to be informed when a material becomes available for which there is a knowledge gap.
- No opinion.
- 'Nano'should be on the label when nanoparticles have been added, so that consumers can choose (Leefmilieu).
- For vulnerable groups precaution should be applied; no marketing without sufficient data.
- Nano should be in the list of ingredients.
- - .
- In future information probably by mobile technology: with click of mobile phone on bar code consumer will get background information.
- 'Nano' does not mean danger. When more information about danger of a nanomaterial becomes available this can get a place in the labeling.
- - .
- Product must be safe. If labeling is necessary, then label must be part of broader information context.

Asked about what they want to see modified, NGOs mention that 'nano' should be on the label (in list of ingredients) and that sufficient data and a reliable risk assessment should be required. The interest organisations stress that nano does not mean danger and that labeling, when necessary, should be part of broader information.

Any national nano labeling scheme which you would like to adopt in your national context? (no. 22) Advantages of such a scheme? (no. 23)

- Material Safety Data Sheets in principle good system to inform user. Product often not suitable for label. For paints we have developed 'aware code', a signal system depending on exposure and toxicity of the solvents. Simple coding with risk number which makes paint comparable. However, producers have stepped out. Although nanomaterials are more complicated, you could think of such a system. Advantage: to assess risks in an independent way .
- Canada, France, Italy are working on a labeling scheme. Consumers should be informed more than is the case now. Advantage: better choice.
- No.
- Signal labeling is important, so consumer can view very quickly what is important. Advantage: three layers can be distinguished: colour codes, the list of ingredients and the reference to the website of the producer (which should be easily accessible).
- No. Advantage: products with nano are recognisable, also important for inspection authorities.
- No.
- If there must be a labeling system it should be an EU system. We will make objections when France notifies a nano labeling scheme. Advantages of labeling are only for a small group and costs have to be paid by everybody.

- No. I do not support a national scheme: should be harmonized at EU level (REACH).
- No.
- No.

Asked about ideas for any national labeling schemes the interest organisations agree that this is not the case and when there must be a system, this should be an EU system. The NGOs mention the system of the material safety data sheets and the 'aware code' which was developed for paints. 'Signal labeling' is seen as important, distinguishing three layers: colour codes, list of ingredients and reference to producer website. Also reference is made to initiatives for nano labeling schemes in several countries.

'Important last points'

- Labeling should focus more on the role of the retailer, e.g. Ikea plays an important role in the materials they have in the shop. They can control the market. So, next to the consumer the retailer must play an important role. He has to be informed, either through regulation or through self regulation.
- We do not have a good idea of the risks. Tension between innovation and risks. When absence of harm cannot be proved: precautionary principle should be applied. More insights in risks should be leading. Until then application should be restricted.
- Lack of definition is fundamental problem.
- Knowledge gaps and lack of data and still nanomaterials used on a large scale. Decision makers should develop a duty of care.
- Notification requirement for enterprises which have to do with nano and an overview of products containing nano, so that policy and inspection can be developed.
- Interview questions are very broad. The use of the concept of 'risk' is not correct. Therefore questions can be interpreted in a different way, depending on culture and background.
- Discussion should not be about new nanoparticles (they are everywhere) but about certain produced nanomaterials and about new risks.
- None.
- None other ones.
- Our viewpoints are still developing. Some companies will prefer non nano products as long as there is not sufficient information.

As 'important last points', next to knowledge gaps, the following issues came up:

- more focus could be laid on the role of the retailer;

- a `duty of care' should be developed for decision makers;

- notification requirements are necessary for policy making and inspection;

- discussion should focus more on certain produced nanomaterials;

- companies might prefer 'non nano', as long as there is not sufficient information.

- it was once more mentioned that the interview questions were very broad and that questions can be interpreted in different ways.

3.3 Overall Conclusions Nanomaterials

Research approach

Interviewees: Among the ten interviewees were 4 NGOs (3 environment/health, 1 consumer), 4 interest organisations (business and industry) and one researcher (consultancy/nanocap).

Questionnaire: Several of the questions about risk are considered problematic by the interviewees when it concerns the ranking of risks of different nanomaterials and when the question makes a connection between risks or harm and labeling.

- The ranking of risks of nanomaterials for health and environment is seen as problematic, because this depends on many circumstances, such as application, exposure, type of material, regulation. It is also seen as a matter for experts (questions 5, 6).

- The questions in which a connection is made between labeling and preventing harm are seen as incorrect (questions 8 and 9). This also accounts for the questions where the connection is made between consumers' compliance with the product information/labeling, when handling nanosilver products and the prevention of harm (question 13). Two interest organisations point out that products on the market are safe.

- In the question about consumers routines the variety in the answers and comments is that broad that the conclusion could be that the question is not clear (question 16).

Main concerns/risks and uncertainties relating to nanosilver

Several interviewees mention the risk for the sewage water treatment and for the surface water. Others refer to experts. Two interviewees see risks as negligible or refer to precautionary measures. As a specific risk the imports from countries like China are mentioned (5).

The other questions about risk are either ranking questions or relate to the labeling. This makes it difficult to draw conclusions (see under research approach). In several questions interviewees mentioned that there should be no marketing without sufficient data about risks (21).

Lack of information and uncertainty are mentioned as a main concern, by nearly all interviewees (4).

The dissemination of information: product information through labeling

In general the views of the interviewees about the trustworthiness of labels vary widely (14). Nanomaterials are mentioned twice as problematic (14).

For product information in general the four NGOs all strongly disagree that there is an informed choice for consumers. The interest organisations vary in their views.

Regarding upcoming EU and national labeling regulation the opinions differ widely about the informed choice for consumers. This could be explained because these regulations (apart from the Cosmetics Regulation) have not yet been established. Two interviewees mention there is an informed choice while referring to the Cosmetics Regulation (questions 10 and 11).

Although the interest organisations do not always support the use of labeling of nano information and are afraid of too much labeling, most of them have the viewpoint that information should be on the label when the consumer wants this ('right to know') (20).

Although more than half of the interviewees agree that most consumers are not interested in nano related product label information, the point has been raised that it is not so much a question of not being interested but a matter of not having enough knowledge to handle the information (12). Another aspect mentioned is that a small group (opinion leaders) does want to know the information on the label (12).

Most NGOs are not satisfied with the current labeling scheme for nanomaterials. There is much lack of information. They want nano on the label (list of ingredients) and reliable risk assessment should be required. The interest organisations agree with the current scheme. They do not see nano specific labeling as important ('there is no danger'). It can be part of the broader labeling. One interviewee refers to the Cosmetics Regulation, which is the only specific labeling regulation to date.

Asked for ideas about labeling schemes elsewhere, mention is made of the MSDS (material safety data sheet, for professional use of chemicals) and of the 'aware code', which was developed for paints as a sort of signal labeling. This 'signal labeling' is mentioned as important and three layers are distinguished: 1. Colour codes; 2. list of ingredients; 3. reference to producer website (22) and use of mobile technology, getting information via the barcodes (21).

The interest organisations emphasize that, when there has to be a labeling system, this should be an EU system.

Responsive regulation - The role of consumers - How do the actors respond – incentives – routine behaviour

There is disagreement between interviewees about the role of consumers in relation to the label. The answers strongly depend on the type of consumer behaviour they have in mind. Four commercial organisations, with the notable exception of the cosmetics industry, agree that consumers' compliance is crucial to prevent harm when handling nanosilver products (13). However, the relation between compliance and prevention of harm is strongly criticized by the others (13).

All interviewees agree on the broad question that there can be a connection between harm of products and consumer behaviour regarding these products (17).

Information and freedom of choice are not always enough. One interviewee mentions that most consumers cannot choose, so some products should not be marketed. (15)

As a lacunae in the present system the role of the retailer in the product information is mentioned.

Regulatory challenges/response management

The statement that more knowledge about consumer perceptions is necessary to support the regulatory process, is supported by nearly all interviewees. At the same time mention is made that the government has its own responsibility to prevent harmful effects of market products and also has to weigh other aspects. Some products should not be marketed (15). It is mentioned that, in relation to the knowledge gaps, a duty of care should be developed by decision makers (Important last points). (Although it is not mentioned this duty of care might be seen as an aspect of the precautionary principle.)

Public engagement and participation

Most interviewees refer to their own situation and conclude that EU NGOs give adequate consideration to national viewpoints. However, some interviewees who interpret the question in general mention several problems, such as too different viewpoints and conflicting interests; it also depends on the goal and structure of the organisation (sometimes more Europe oriented) (18).

As far as concerns the negotiating at the EU regulatory level most interviewees mention that their views are taken into account by EU NGOs. Three commercial organisations argue the situation is different: they negotiate themselves at the EU regulatory level, or the national organisation follows the EU and sometimes taking into account national views is not possible (19).

3.4 GMOs: overview per question

Interviewees: NGO Greenpeace, Organic Farmers organization BIOLOGICA, Biotech Industry Association NIABA, Agricultural Companies LTO Noord, Federation of Food Industries FNLI, Food Retail Association CBL, International Dairy Company CAMPINA.

Main concerns regarding GMOs (question 4)

- Unpredictableness GM as technique; Uncontrollability of contamination (gm /non gm cannot be distinguished from outside); Irreversibility (living organisms); risk assessment GMOs does not take long term into account properly; 'expert reports' not critically reviewed by courts; researchers not independent from industries.
- Freedom to choose for organic sector is threatened (imports GM feed and lacking GM free additives); Co-existence problematic in the Netherlands; Socio-economic problems (conflicts farmers); farmers fear contamination and fear loss of GM free market; No liability rules; no insurance is possible.
- Debate too emotional; advantages of GMO might not be used; Higher costs of GM free feed to avoid GM label for livestock farming.
- Import of GM products which are not EU authorized (not allowed in Europe); Europe is behind with authorizations compared to South America/Asia, US.
- Overregulation. Discussions do not focus on safety but on technology. Research shows no negative health effects; EFSA: safe, but politicians think otherwise.
- No opinion.
- Debate too emotional. Costs of Non GMO feed too high, especially when 'hard IP' (documents country of origin).

Concerns vary widely: unpredictability, uncontrollability , irreversibility and inadequate risk assessment, and dependency of researcher of industries, loss of freedom of choice, co-existence problems and fear for contamination of crops, and a too emotional debate, overregulation and differences between EU assessments and other parts of the world.

Which GMO related products in your view constitute highest health risk? (ranking) (question 5a)

- Ranking problematic. However: 3. BASF potatoe (antibiotic resistant genes); PM Development GMOs that will produce chemicals. 2. Round up resistant crops (Glyphosate) and Liberty Link rice (broad spectrum herbicides); 1. US pig vaccins in genes for maize.
- Not any specific health problems; however: consumers don't want unknown and unnatural additives or GMOs.
- No health risks demonstrated in research. Notwithstanding this: long term effects can never be excluded. Starch potato no health aspects.
- Leading question. Presumes risks. In case of any risk: no authorization. So, no risk, we also trust assessments in other countries.
- Leading question. Presumes there are risks. There are no scientific ground for fears of unsafety.
- Leading question. Products assessed as safe.
- No concern about risks.

The request to rank health risks is seen as problematic by all interviewees and is considered a leading question by the industrial organisations and company, because products are assessed as safe. The agricultural organisations do not consider health risks as specific problem, although one interviewee emphasizes that consumers do not want unknown or unnatural additives or GMOs, and another interviewee mentions long term effects can never be excluded.

Which GMO related products in your view constitute the highest environmental risk? (ranking) (question 5b)

- 3. BT crops (modified with Bacillus Thuringiesis, which contaminate environment on and around the crops); 2. Herbicide resistant crops (Roundup Ready, Liberty Link etc., which stimulate monocultures). 1. GM maize in Mexico or GM poplars in the Netherlands etc. (centres of biodiversity; old varieties are contaminated). Round table Responsible Soy only takes into account some very old pesticides, which already should be forbidden; enforcement?
- Application aspect: Biggest problem: large scale agriculture (e.g. herbicide resistant crops); fundamental aspect: technique affects integrity of organisms; unpredictable consequences for environment.
- Risks for countries of origin (causing herbicide resistant weeds); herbicide resistant developments = misuse of GM.
- Leading question. Scientists have to decide about risk. Product on the market means: no risk.
- Question not neutral. Possible environmental effects countries of origin have to do with agriculture in general, not with GM.
- Leading question.
- No risks. For resistance and too much spraying in countries of origin: we have Round table Responsible Soy.

The request to rank environmental risks is answered more or less in the same way as the former question about health risks. The question is also seen as too leading and the absence of risks is stressed. Environmental risks for countries of origin are also mentioned (related to misuse of GMOs) and the problem of the very large scale agriculture, which will accompany GMO use, causing herbicide resistant crops and unpredictable consequences for the environment. One interviewee gives a ranking based on environmental consequences of contamination and biodiversity threats.

In your work, are you concerned with GM soy products (question 5c)

- GM soy used for our intensive farming (pigs, chickes); some used in food products (cheap margarine, salad oils, snack bar fatty oils). The 'genetechnique free' label in the Netherlands may only be used under strict conditions. Problem: veterinary drugs are only GM drugs.
- Contamination of soy for feed is biggest problem.
- 100% GM free in feed chain is not possible, so we have lobbied for the 0,9 % standard.
- GM Soy mainly for feed pigs, chickens; Soy for food industry most GMO free (maybe small traces of lecithine by GM). Indirectly: GM fed cattle: meat is not seen as GM. GM halvarine mostly based on GM soy.
- Yes, we GM soy products are on the market.
- Not applicable .
- No GMOs in our products. Use of GM feed does not have to be mentioned on the label. This would give the wrong information to the consumer.

With regard to GM soy products the following concerns are mentioned: the use in food, the contamination of soy for feed, the veterinary drugs which are only GM drugs, the very strict conditions of the 'produced without gene technique' label. The interest organisations seem to have interpreted this question as 'working with or having to do with GM soy' and they do not mention problems.

In your perception: are there any risks related to GM soy? (question 6)

- Freedom of choice; Environmental harm because of pesticide use; Loss of biodiversity; unpredictable long term effects.
- Herbicide resistance leading to more pesticide use. Effects of Roundup on health and environment; Unknown health risks built in genes.
- Herbicide resistance and danger of cross contamination in countries of origin.
- Advantages for consumers and farmers are underestimated; risks are not different from risks ordinary soy.
- Leading question, because only risks are mentioned. If found safe, there are no risks. Round table sustainable soy: problems have to do with soy culture in general.
- Leading question.
- Risks in countries of origin (escalation GM Roundup ready soy and pesticide spraying Roundup) are now answered by Round Table policy with pesticide spraying criteria (no legislation). Non GM can also be certified .

The following risks related to GM soy are mentioned: loss of freedom of choice, loss of biodiversity and unpredictable long term effects, harm because of pesticide use, herbicide resistance, unknown health risks of built in genes, danger of cross contamination. Industry organisations consider this a leading question. Advantages are underestimated. The problem of pesticide spraying in countries of origin by some interviewees is considered as not being a GM problem but a soy problem in general. The 'Round table responsible soy' is mentioned as a solution for problems of pesticide spraying.

Compared with GM soy – are products with other GMOs more important for your work because of potential harms? (question 7)

- Yes, GM rice from China (Kefeng 6 and BT 63); no health assessment done; sometimes no reference material available (linseed), so only by accident found. See rapid alert system warnings.
- Soy will not be grown here. GM maize or potatoes is more worrying.
- No. Soy mainly cultivated overseas. Maize also here.
- There are no such risks.
- Too much attention is given to the label; GM). Relevant questions are not discussed. No rational debate about advantages and disadvantages. Sustainable agriculture? Discussion not possible.
- No.
- No. Not applicable.

Compared to GM soy some interviewees mention products that are more important for their work, because of potential harm. Mentioned are: the GM rice from China which was not assessed at all and the GM maize or potatoes, which other than soy, could be grown in the Netherlands, which would have worrying consequences. One interviewee considers it a general problem that a rational debate about sustainable agriculture is lacking.

Statement: Rules presently in force concerning GM food product information via labeling are *necessary t*o prevent potential harms (no. 8).

- Tend to agree; important is freedom of choice, even when DNA of GMO soy is not found in milk.
- Tend to disagree. Strange question. Labeling is for freedom of choice. Risk is assessed in authorization procedure.
- Strongly disagree, Labeling has nothing to do with preventing harm but with consumer choice.
- Strongly disagree. Labeling no solution for preventing harm. Biased question. If any risk then not on the market.

- Strongly disagree. Labeling is about freedom to choose. Harm is covered by legislation.
- No opinion.
- Strongly disagree.

With the statement about the current rules on product information (labeling) for GM food and the necessity of these rules to prevent potential harms most interviewees disagree, mainly because labeling is linked to risk.

Statement: Current EU and national regulation for GM food labeling is *sufficient* to prevent potential harm (no. 9).

- Strongly disagree. Labels are lacking e.g. on milk and clothes.
- Strange question. Labeling does not prevent harm.
- Strongly disagree. Labeling has nothing to do with harm.
- Not applicable. Labeling is not about harm.
- Strongly disagree. Harm and labeling should not be connected.
- Strongly agree.
- Strongly agree .

The opinions about the statement that current labeling regulation for GM food is sufficient to prevent potential harms are very outspoken and very different, mainly because labeling and harm are connected in the statement. Mention is also made that labels are lacking for many product categories (milk, clothes).

Statement: In general: current product information provisions enable consumers to make informed choices (no. 10).

- Tend to disagree. Informed choice does not depend on label. Labels are sometimes unclear and confusing.
- Tend to disagree. Substance E-numbers often not given. Much work to find out what is in a product and what it does.
- Strongly agree. Who does not want to take any risk can choose organic.
- Strongly agree. Enough information on label. Maybe too much. Consumer is informed. Legislation requires too much labeling. Another question is whether consumer understands label
- Tend to agree.
- Strongly agree.
- Strongly agree.

The statement that current product information enables consumers to make informed choices is strongly agreed by industry and business organisations and by conventional farmers, because there is enough on the label and one can always choose organic. Two interviewees tend to disagree because labels are not always clear and because it is not easy to discover what is in a product.

Statement: In general: current EU and national regulation GM labeling enables consumers to make informed choices (no. 11).

- Tend to disagree. Information should be added and label should be bigger.
- Tend to disagree. Labeling helps but: lacunae: GM vitamins not taken into account in labeling. Threshold 0,9 % means there can be GM in product without labeling.
- Tend to agree: Consumer cannot choose when product comes from animal fed with GM feed.
- Strongly agree .

- Tend to agree. Choice is not informed because consumer does not understand information about technology. Other technologies not mentioned.
- Strongly agree .
- Strongly agree .

The statement that GM labeling regulation enables consumers to make informed choices is agreed by most interviewees. At the same time some of these interviewees mention that choice is not informed because consumer does not understand the label, and that the consumer cannot choose whether the product comes from an animal fed with GM feed. Two interviewees tend to disagree because there should be more on the label and there are lacunae, such as GM vitamins which are not taken into account in the labeling.

Statement: Most consumers are not interested in the information provided through GM food labeling (no. 12).

- Tend to disagree. Consumers generally do not know GMOs can be in the product. See Eurobarometer, which shows interest of consumers. After labeling was required the number of GMO products went down.
- Tend to disagree. Consumers are interested. You cannot draw conclusions about reading labels and choosing when there are so few GM products on the market. Consumers expect products are GM free. See European Co-Extra research: when they know they will not buy it.
- Tend to agree. Most consumers are not interested, but a small group is.
- Strongly agree.
- Strongly agree.
- No opinion.
- Strongly agree.

Four interviewees agree with the statement that most consumers are not interested in the information provided through GM food labeling. The two disagreeing interviewees argue that consumers generally do not know that GMOs can be in the product, referring to Eurobarometer opinions and arguing that conclusions cannot be drawn when very few GM products are on the market.

Statement: Product labeling is generally trustworthy (no. 13).

- Tend to disagree. Depends on label and on the criteria for control. SKAL is good.
- No opinion. Difficult to answer. I have not done research.
- Strongly agree.
- Strongly agree.
- Strongly disagree. Label is trustworthy but is filled with information which is not understandable for consumer.
- Strongly agree.
- Strongly agree.

The statement about the trustworthiness of product labeling is agreed by four interviewees. There are two disagreements, reasoning that the trustworthiness depends on the label and that the label is not understandable.

Statement: In general, it would be necessary to know more about consumer perceptions to support the regulatory process (no. 14).

- Tend to disagree. For labeling relevant to know a big part of the Dutch do not want GM products on their plate. On the other hand, as a consumer you ought to be able to rely on government that e.g. no pesticides on your plate. Then perception is not necessary to know.
- The controversy has to do with not having trust in the government. With a proper freedom of choice commotion under consumers will disappear. Government is much pro GM. This makes consumers suspicious.
- Tend to disagree. Good to know about opinions, but consumers do not know everything and what they think is based usually on the media. Opinions of experts are more important here.
- Tend to agree/disagree. Always important to know opinions and create support. But question suggests that we do not know enough.
- .. .
- Strongly disagree.
- Informed but not sure. Difference between consumer and citizen. Citizen wants to know a lot, but consumer goes for the cheapest.

The statement that it is necessary to know more about consumer perceptions to support the regulatory process leads to disagreement or to mixed feelings. Disagreement because government has its own responsibility and because consumers do not know everything and expert opinions might be more important. Mixed feelings because the statement suggests we do not know enough and because the citizen wants to know but the consumer goes for the cheapest.

Statement: Current everyday routines of consumers are sufficient to prevent harm from GMOs to health or environment (no. 15)

- Strongly disagree. Everyday a ship with gentech soy is imported, so routines are not 'sufficient' .
- Unclear question. Harm for environment is caused by cultivation. Harm for health is dealt with in authorisation procedure and not in labeling.
- Strongly disagree. Harm and risk take place in earlier stage, in country of origin.
- Strongly agree. There can be harmful routines but this has nothing to do with GMO discussion .
- Strongly disagree. Question is not clear. It does not depend on consumer whether a product is safe. The two parts of the statement do not connect.
- No opinion.
- Strongly agree.

The statement about routines of consumers being sufficient to prevent harm, leads to the following answers: strong disagreement (3), strong agreement (2), unclear question (2) and no opinion (1). Main criticism is the connection between harm from GMOs and daily routines of consumers. Harm for the environment is caused by cultivation in countries of origin and not in the consumer phase (2).

Is there a connection between harms to health and/or environment and the consumer purchasing behavior with regard to GM-soy products? (no. 16)

- Do not agree. See answers given before, about negative effect of GMOs.
- Consumers reject GM products because of harm to their health. In the Monsanto movie environment and behaviour of GM companies also plays an important role. Difference citizen – consumer, probably. However, first reason for consumer to buy organics is health.
- Strongly disagree. Products are safe, because authorised. No connection.
- No. Question phrased very negatively. It suggests a relation between consumption GM product and risk. Comparison should be made between GM and non GM: harm to rainforest is not linked to GM but to agricultural practices in general..
- No. There is no harm, so there is no connection.
- No.
- No. Totally no connection.

This statement about the connection between harm and the consumer purchasing behavior regarding GM-soy products mainly leads to disagreement because most interviewees consider products as safe. One interviewee refers to earlier answers about negative effects of GMOs. Another interviewee rephrases the question and states that consumers do reject GM products (and by organic) because of health concerns.

Statement: In general, European stakeholders in your field give adequate consideration to national points of view of their national counterparts (no. 17)

- Tend to agree. Question is not very clear.
- Strongly agree. Regional group of IFOAM, meeting in Brussels, works very well.
- Tend to agree. Difficult to reach an EU general view, because one country wants more than the other. So, organisations do part of the lobby work themselves. The Netherlands lobbies with several counterparts in other countries.
- Strongly agree/Tend to agree. Interviewees organisation takes part in EUROPABIO. However national stakeholder cannot always determine an EU opinion.
- Strongly agree. The CIAA is interviewees organisation.
- Tend to agree.
- Strongly agree. Interviewee is a member of EDA.

This statement about EU stakeholders giving consideration to viewpoints of national counterparts, raises agreement under all interviewees. Several organisations take part in the EU lobbying themselves. They note that agreement is not always possible.

Statement: national stakeholders like yourself have adequate opportunity to engage in participatory procedures at EU level (no. 18).

- Tend to agree. With our citizens initiative we mobilized one million signatures. Commission is still hesitating to accept this, because they would have to do something with the results. Participation in EFSA by our scientists cost a huge amount of time and energy, without results. Participation procedures are followed, but results might not be used. Litigation necessary.
- There are possibilities to participate, but this could be improved. There is overkill in internet information and participation possibilities, but not enough feedback about results.
- Strongly agree. If you are active, no problem to participate and lobby. For Netherlands more easy than for Member States far away from Brussels.
- Tend to agree. There are possibilities, but it costs very much time to participate. Stakeholders are sometimes buried with information. Even more difficult for new Member States.
- Strongly agree. Depends on person. CIAA depends on input members.
- Tend to agree.
- Strongly agree.

All interviewees agree that there are opportunities to engage in participatory EU procedures, but at the same time they mention the difficulties because of the huge amount of time this costs. There is an overkill of information and not enough feedback about what is done with the results.

Statement: I am satisfied with the current GMO-labeling scheme (no. 19a).

- Tend to disagree. Content with food labeling, but no freedom of choice for products of animal origin, cotton and biofuels. Interviewee pleads for labeling of these kinds of products. Besides GM-free labeling is still far away in the Netherlands.

- Strongly disagree. Vitamins and micro-organisms are not taken into account. The 0,9 % standard is not kept strictly. Tendency to fill up the space of the standard. Standard is meant for 'adventitious or technically unavoidable' situations. Media also influence this. Companies want more clear interpretation.
- Tend to agree. We do not see the necessity because there are no health risks, but consumers want it.
- Strongly disagree. Label reflects strange idea of reality. Threshold percentages imply that with very little mixing GMO labeling is required. Even a zero percentage for varieties not yet authorized in Europe. Next to that labeled items cannot be proved. Label should contain what is relevant and useful, such as allergies and also 'concept-labeling', such as 'ECO' (product satisfies set of conditions).
- Tend to agree. We do support transparency, but consumer only knows half the story. Label is seen as solution for every problem. An easy solution for the government.
- Tend to agree.
- Strongly agree. It meets the wishes of consumers and citizens.

The statement about satisfaction with the current GMO labeling scheme is disagreed (3) and agreed (4). Disagreement because lack of freedom of choice for products of animal origin, cotton, biofuels, vitamins and micro-organisms, because of the tendency to fill up the 0,9 % standard (2) and because the label does not reflect the reality of what is in the product (1). Agreement because labeling meets wishes of consumers and citizens (4).

Statement: If there is a *national* GMO labeling scheme: I am satisfied with this scheme (no. 19b).

- Tend to agree and strongly disagree. Our scheme is an EU scheme. I tend to agree for food, but strongly disagree for the rest. Too much lacunae in freedom of choice.
- Question not applicable. There is no such scheme. There is 'made without genetechnique', but not much used in the Netherlands. In Germany less strict than here. SKAL cannot control 'made without genetechnique) because they cannot control the non organic sector. Non organic additives would need a 'GM-free'statement.
- Strongly agree. Content without national scheme. We want EU scheme. Dutch Novel Foods Decree (label without genetechnique) is national implementation of EU provision. Important for organic sector.
- Not applicable. There is no national scheme.
- Tend to agree. Specific 'gentech free' labeling is OK (policy latitude for Member States), but regulation at EU level would be better. Now it differs slightly per Member State.
- Tend to agree .
- Strongly disagree. There is no national scheme. 'Gentech free' should be harmonized more at EU level. In Germany feed grown in Germany is used for Landliebe. Small part of the market. More demand for 'gentech free' in Germany than in the Netherlands. A small group wants to pay more. Who wants 'gentech free' can buy Campina organic milk.

The statement about satisfaction with a *national* labeling scheme is seen as not applicable by three interviewees, because they conclude there is no such national scheme. Others see the 'made without gene technique' as a national scheme. Three interviewees want this label more harmonised at the EU level. One of these three interviewees strongly opposes the national GM-free label, the others are content with the national scheme. One interviewee disagrees because of the lacunae for other products than food, which means lack of freedom of choice.

In case you are not satisfied with status quo of GMO labeling, in what way would you like to modify it and why? (no. 20)

- Freedom of choice for feed, cotton and bio based products. Greenpeace litigated for years about interpretation by the ministry of the 0,9 % standard. In the end, during the court case, the ministry withdrew the contested decision and replaced it by the strict interpretation which Greenpeace always followed. This important change did not get enough publicity.
- Labeling should also be required for products made with GM micro-organisms. The 0,9 % threshold should be interpreted more strict.

- Important that it is harmonized at EU level. So content with present situation.
- Label should contain what is relevant for consumer. A more rational form, not arbitrary, is important. Stopping the labeling scheme in its present form should be considered. Consumer now is informed e.g. about GMO in deep frying fat at home, but not about deep frying fat in snackbar.
- Preference for giving up labeling scheme in its present form. The current form of process labeling differs from the regular form of product labeling (what is in the product). The 0,9 % standard refers to the process, not to the contents.
- No opinion.
- Satisfied with GMO labeling but not with the 'gentech free' labeling, which should be regulated at EU level.

Modifications of the present GMO labeling are wished for feed, cotton, biobased products and products made with GM micro-organisms (1), more strict interpretation of the 0, 9% standard (2), more EU harmonisation of 'gentech-free' (1). Two interviewees would prefer giving up labeling scheme in its present form because it either is not rational or because it is a form of process labeling instead of product labeling.

Do you know about any national GMO labeling scheme which you would like to adopt in your national context? (no. 21) And what are the eventual advantages of this labeling scheme? (no. 22)

- The German system 'ohne gentechnique'(Greenpeace). Freedom of choice. Liability, chain control: a label is an economic incentive to have and to guard separated chains. Labeling will stimulate separate chains. Now more and more contamination with GM takes place. First products of animal origin should be labeled.
- No.
- No.
- No.
- US labeling GMO products: producer is free to choose for GMO or non GMO labeling. Of course it should not be misleading. Companies then can choose. (Food Ind.). Then you can communicate depending on what consumers want.
- Not applicable.
- No.

As far as concerns labeling elsewhere which one would like to adopt in the national context, the German 'ohne gentechnique' system is mentioned (1) and the US system where the producer is free to choose (1).

As advantages of these schemes are mentioned the freedom of choice of the 'gentech free' system and the incentive for chain control and separated chains (no contamination). For the US system it is considered an advantage that the producer is free to communicate what consumers want.

Any other important points? (no. 23)

- Comparing GMO discussion with nano discussion gives us the feeling that these projects suppose that GMOs are sustainable and that environmental NGOs have done something wrong by spoiling the image of GMOs. Policy makers are afraid the same will happen to nano. Seen as a sort of pitfall.
- None.
- Tendency that Member States may differentiate more. This means movement, but also means concessions are done to one EU market. We propose a regulation at EU level, with as much harmonization as possible.
- Hopefully the Seberoc project will make a clear difference between authorisation (2001/18), which has to do with cultivation and environment, food safety legislation and labeling legislation. Relation between labeling and food safety is only for specific aspects and not for GMO. Consumer cannot choose between safe and non safe. Safety is regulated first.
- None.

- For neutral government organizations participating in SKEP, the questions about risks of GMOs in our view are phrased in a very leading way.
- No.

The following new GMO point was mentioned as important:

The political tendency that Member States may differentiate more, which means market concessions will be done.

The other points mentioned have to do with the Seberoc project and the questionnaire:

Two interviewees stress the difference between authorisation and food safety (legislation) on the one hand and labeling (legislation) on the other hand.

The questions about risk were seen as rather leading.

The comparison between nano and GMO tends to see the GMO process (and the role of NGOs in that process) as a sort pitfall which should not happen to nano.

What do you think could be learned from nano? (no. 24)

- Although I am not a nano expert: Maybe to do a risk analysis. With BT maize e.g. risks were assessed when the crop was already on the field. Also long term effects have to be taken into account. New technologies should be handled applying the precautionary principle.
- Question should be other way around. Cannot be answered in way as phrased now. For nano there is the fear that it will develop in the same way as GMO.
- I am not an expert in the field of nano. No opinion.
- Question other way: crucial is the establishment of a definition. This should not be a political deal. When no definition, no separate legislation.
- Other way around: From GM discussion we have learnt that transparency is very important and that consumers have to see advantages, otherwise they will not accept new technology.
- When a product of technique is approved by EFSA and is considered safe, then we must rely on their expertise, for nano and for GMO.
- GMO discussion is an emotional discussion between believers and non believers. This could also happen to nano.

Most interviewees preferred phrasing and answering the question the other way around. From the GM discussion transparency, the importance of advantages for consumers, agreeing on definitions and avoiding an emotional discussion can be learned. One interviewee mentions that from nano GMO should learn to do a proper risk analysis, including taking into account long term effects and handling new technologies according to the precautionary principle.

3.5 Overall conclusions GMOs

Research approach

Interviewees: Among the seven interviewees were: 1 NGO, 1 Organic farming org., 1 Conventional farming org, 1 Biotech Industries, 1 Food Industries, 1 Food retail org., 1 International dairy company.

Questionnaire:

- Some questions were considered too leading by several of the interviewees. This was the case for the ranking of health and environmental risks of GMOs (5a and 5b) and the question of risks of GM soy (6).

- The questions which link labeling to potential harm are considered problematic questions by several interviewees (8 and 9).

- The question about everyday routines of consumers and the prevention of harm was considered unclear by some interviewees, while others strongly disagreed about the relation between harm and consumer routines, and others strongly agreed. This variety of answers gives the impression the question indeed was not clear (15).

- The question what can GMO learn from nano by most of the interviewees was answered the other way around (what can nano learn from GMO) (24).

Main concerns/risks and uncertainties relating to GM soy

Concerns vary widely: there are concerns about the technology and the decision making process, the dependency of researchers of industries, loss of freedom of choice, co-existence problems, fear for crop contamination and fear for a too emotional debate (4).

The questions about risks are seen as leading questions by the commercial organizations because they do not see grounds for risks. One interviewee points at risks because of antibiotics resistance and herbicide problems (resistance against glyphosate). Risks for the countries of origin and negative effects of large scale agriculture are also mentioned (5a and 5b).

For the risks of GM soy the contamination of non GM soy by GM soy for feed is mentioned and the fact that available veterinary drugs are only GM drugs and the loss of freedom of choice because of the contamination (5c and 6).

The dissemination of information: product information through labeling

Most (5 out of 7) interviewees agree that in general current product information provisions enable consumers to make informed choices. Critical comments about the labeling are: unclear labels, lacking E-numbers and much work to find out what is exactly in a product (10).

Also for GM labeling most interviewees agree that labeling enables informed choices. Two interviewees disagree because there should be more on the label and because vitamins are not taken into account in the labeling (11).

The trustworthiness of product labeling in general is agreed by four interviewees. One interviewee notes this depends on the enforcement (referring to SKAL as a good example). Another interviewee stresses that the problem is not the trustworthiness but the understandability of the label (13).

Four interviewees agree with the statement that most consumers are not interested in the information provided through GM food labeling. The two disagreeing interviewees motivate this with the fact that consumers do not know that GM products are on the market and that conclusions cannot be drawn with so few GM labeled products on the market (12).

Four interviewees are content with the current GMO labeling; three interviewees disagree. The disagreement is either because the labeling requirements reflect a strange idea of reality, e.g. because labeling is already required when there is a very small percentage of mixing (1), and because of a lack of freedom of choice regarding products of animal origin, cotton, biofuels, vitamins and the 'filling up' of the 0,9% (2) (question 19a).

The provision for a label 'made without gene technique' is seen as a national scheme by four interviewees, and by others as an EU-scheme with flexibility for Member States. Three interviewees want a more harmonized EU label. One interviewee strongly opposes a national label. Another sees too many lacunae in this provision because requirements are too strict and the result is now that it is hardly used; so they conclude there is a lack of freedom of choice here (19b).

Changes in the current labeling scheme are wished by two interviewees, for feed, cotton, bio based products and products made with GM micro-organisms. Two are more or less content with the current scheme. Two interviewees suggest ending the labeling scheme because it is a form of process labeling instead of product labeling, or because it should be more rational (20).

Two interviewees mention another labeling scheme which could hold advantages: the German 'ohne gentechnik' is mentioned once and the US system where the producer is free to choose for communication GM or Non GM is mentioned once (22).

Responsive regulation – role of consumers – routine behaviour – response of actors – incentives

The relation between the routines of consumers and the prevention of harm is not only criticized because of the connection between harm and the daily routines but also because harm for the environment is caused in an earlier stage, in the countries of origin (15).

Five out of seven consumers disagree with the statement that there is a connection between harm to health and environment and the consumer purchasing behaviour. The NGO refers to the answers given before and the organic farmers note there is a connection in the way that health and environmental concerns are a reason for not choosing GM products (16).

Regulatory challenges / response management

The statement that it would be necessary to know more about consumer perceptions to support the regulatory process (14) is either disagreed with, or seen as complex (e.g. difference between consumer and citizen).

Public engagement and participation

All interviewees agree that EU stakeholders take into account national points of view of the national counterparts. However, some also notice that there can be difficulties, because agreement is not always possible (17). About the opportunities to engage in EU procedures there is also agreement, but at the same time the difficulties are mentioned: overkill of information, huge amount of time it costs to participate an lack of feedback about what is done with the results (18).

3.6 Comparing nano - and GMO answers

Interviewees:

Among the ten nano interviewees there were 4 NGO's and 5 commercial organisations and 1 researcher. Among the seven GMO interviewees there was only 1 NGO, 2 agricultural organisations, 3 commercial organisations and one company. This means that in the nano interviewees the NGO positions are more broadly represented and in the GM interviews the commercial/agricultural positions are more dominant.

Concerns for risks or harm

Otherwise than for nanomaterials, where there is a general concern about lack of data, for GMO there is not one overall main concern among the interviewees.

The ranking of risks is often considered problematic for nano (depending on the application or seen as a matter for experts) and for GMOs the ranking is often seen as a rather leading question because no risks are seen, or the ranking is considered difficult because risks partly take place in countries of origin.

Labeling as an instrument

For nanomaterials labeling is considered to be a useful instrument, which however has its limits and should be accompanied by other instruments. Suggested were layers of information: 1: signal/colour code; 2. list of ingredients; 3. easy accessible website of producers (e.g. via mobile telephone programme). The commercial organizations see labeling only at the EU level.

For GMO the ideas about the usefulness of GM labeling differ very much. Some see it as useful but too restricted (lacunae for e.g. vitamins, products of animal origin). Others see is as not useful, e.g. because it is a form of process labeling and the gmo cannot be traced in the product.

Right to know

For nanomaterials most interviewees tend to the 'right to know'. When consumers wish, 'nano' should be on the label. However, several interviewees do not see labeling as useful, because, among other aspects, the consumer despite the labeling still does not know anything about risk, or because most consumers will not read the label.

For GM some interviewees see the labeling as irrational and therefore have the opinion that ending the labeling scheme should be considered. At the same time two other interviewees argue that the labeling should be expanded.

An aspect which was not considered for nanomaterials is the GM-free label, which all interviewees seem to agree with, although some only under the condition that it is fully harmonized at the EU level.

Participation in EU procedures

The answers about possibilities to be represented at the EU level by EU stakeholders and to participate in EU procedures are more or less the same for nanomaterials as for GMOs. Interviewees are content, although some do see difficulties and some are taking care of lobbying themselves. For the GMOs the huge amount of time that participation costs, the overkill of information and the lack of feedback are mentioned.

4 Conclusions of the focus groups for nanosilver and GM-soy in the Netherlands

4.1 Introduction

This document gives an overview of the results of the focus groups with consumers in the Netherlands. It aims to summarize the results of the case-studies (nano and GMO) and to compare these results. Section 4.3 draws conclusions about the nano-focus groups and Section 4.5 about the GM-focus groups. Section 4.6 presents a comparison of the cases.

4.2 Nanomaterials: overview per question

Group 1, May 31, 2011				
	Gender	*Age*	*Level of education*	*Living with children*
P1	Female	47	Higher secondary	Yes
P2	Male	35	University	No
P3	Female	29	University	No
P4	Female	58	University	Yes
P5	Female	48	Higher secondary	No
P6	Female	52	University	Yes
P7	Female	49	Higher secondary	No
P8	Female	42	Higher secondary	Yes

Group 2, July 5, 2011				
	Gender	*Age*	*Level of education*	*Living with children*
P1	Female	26	University	No
P2	Male	40	Higher secondary	Yes
P3	Female	33	Higher secondary	Yes
P4	Female	49	Higher secondary	Yes

P5	Female	45	University	Yes
P6	Male	46	University	Yes

Questions	Answers
Introduction by facilitator Self-Introduction of participants. Warm-up question related to the topic or the products: Could you please describe whether you use chopping boards in your kitchen; and, if yes, how does your favourite one look like?	Some participants had about 4 chopping boards, each for a different purpose (e.g. things that are dry, things that are wet, bread, onions, vegetables, meat, poultry). Some had 1. There were preferences for chopping boards made of wood, glass and plastics. Some participants preferred one type of material (only wood, only glass, only plastic), others had different types of cutting boards. "I have heard several horror stories about wooden boards, therefore I prefer plastic ones." "I prefer a wooden board; it is somewhat less hygienic, but it is practical and beautiful and it protects my knives."
We would now like to talk with you about nano products. These are products which have been produced with nanotechnology that operates at a scale below 1/1000 mm, or products that contain particles that are smaller that 1/1000 mm. 1 nanometre is one millionth of a millimetre. What comes to your mind if you think about nano products?	The question generated several questions. "These particles, do they also include bacteria?" "What is the difference with molecules?" "What is really typical for these particles?" "Is it the same as those small soot particles?" Other associations were: - Cosmetics, sun lotion - Socks - Coatings and cleaning products - Medical instruments - Small white colouring matter, which may cause water pollution in the sewer drain - Electronic industry - "Nano is a kind of hype in the Netherlands; it is hip, but the hype may also be associated

	with some fear." - "But it is unclear what will happen with sun lotion on your skin; it might be harmful if the nano particles penetrate into the skin."
And what comes to your mind if you think about nano-silver?	- Cosmetics, deodorant - Socks - "My association is that it is used for several purposes, but that it might not be completely safe."
And what comes to your mind if you think about nano-silver chopping boards?	With a few exceptions, the participants had almost no associations. "If there is nano-silver on the chopping board, it might get into your food." "If you eat small pieces of plastic, that is not really a health problem, as far as I know." "There is a paint that was used for boats because it protected them from algae, but it also caused water pollution and it has been banned. That is my association. Nano-silver in a cutting board will be anti-bacterial or anti-pathogenic. I would be somewhat worried about that, because how can the particles be effective if they are completely contained within the board. But maybe I am wrong."
Now we are interested what importance chopping boards have in preparing food in your kitchen.	Chopping boards are used on a daily basis. They are not replaced very often. But if that is necessary, the participants just buy a new one. Or they may use a plate as a temporary solution.
What are the most important criteria for you if you buy a chopping board?	- Its size (I need different sizes). - That it is made of wood (glass is bad for my knives). - That it is made of glass (don't want tiny pieces of wood or plastic in my food). - That it is made of wood (wood is natural material, no reason to worry about small pieces). - That it is made of plastic (there is no reason to worry about tiny pieces, these will not be taken up by the body). - That it is made of plastic (plastic dries much faster than wood, and you will get much less bacteria if the board is dry; wood has to be cleaned by rubbing with salt). - That is does not warp too much (a warped chopping board is unpleasant).

	- That it can be hanged for drying (if not there will be black stains on the board).
You might have heard that there are nano-silver-coated chopping boards on the market. Can you imagine that there is a difference between a nano chopping board and a conventional chopping board? Please specify potential differences. If there is no feedback: Explain what nano-silver is and does: "it is a coating which you cannot see and gives the chopping board an anti-bacterial effect"	The participants did not know that these products are on the market. "I can imagine that someone wants a chopping board with an anti-bacterial effect." Another association was that nano chopping boards might be more wear-resistant.
What importance do the criteria that you have named have for you if you buy chopping boards? A rather great importance or rather minor importance?	Size and preferred type of material were criteria of great importance.
If you imagine you are inside the head of your friend: What do you feel is their most important reason why they want to buy a nano chopping board?	There was no clear notion of such a person. Some participants suggested that a nano chopping board might be attractive for persons who are extremely concerned about hygiene. "Someone who keeps spotless house."
Now imagine you are inside the head of another of your friends who wants to avoid buying a nano chopping board. What do you feel is their most important reason why they want to avoid a nano chopping board?	Avoidance was not an issue for the participants. But a reason for avoidance might be that such small particles are found scary. "I don't know where these small particles are going to end. I just have an association with asbestos."
We are now distributing a chopping board to each [pair of] you. Is there anything about this that catches your attention?	*A conventional chopping board was featured with a "ten minus nine" logo.* Some participants recognized the scientific notation

	"ten minus nine".
Have you seen this label or a similar nano label before?	No.
What do you think does this label tell you?	"Does not mean anything." "I assume that it is incorporated within the product." "Maybe it has to suggest some extra quality that makes the board more expensive." "Yes, like an advertisement: Now with nano!"
Would this label influence whether you buy a chopping board?	No.
Re-collect the product	
We are now showing another chopping board to each pair of you. Is there anything special/conspicuous about this product?	*The second product was the only nano chopping board that is on sale in the Netherlands (to the best of our knowledge). It can be bought in specialty shops for cookware. It is a plastic chopping board with on-package information about its anti-bacterial effect, which is attributed to "active ingredients that do not migrate and kill bacteria on the surface of the board".* The participants were not aware of this product and they looked at it with amazement.
Have you seen this or a comparable kind of nano information before?	There was no association with other types of information.
What do you think does this information tell you?	The notion that the "active ingredients do not migrate" raised questions about what that means. Some participants said not to believe that such a claim can be true ("maybe only if the board is not being used"). One said: "It is plastic and that means that tiny pieces of it will get into your food. I don't like this type of material, because it is disgusting to find pieces of plastic in your food". Another said: "I agree that it is disgusting, but that does not mean that the active ingredients migrate out of the plastic into your body."

	Another remark: “If you don’t know what the active ingredients are, you cannot say how harmful they might be.” “If you believe that it has an anti-bacterial effect, you don’t know how long that will be effective. Maybe, you will get a lot of bacteria growing on the board if it has lost its effectiveness.”
Would this information influence whether you buy a chopping board?	“No, I don’t think that I would buy this product if I read this text.” “Well, I prefer a product with this information over one without it. Maybe it would influence me, but I still will keep on using different chopping boards for different purposes. I will not think that I can do everything using one board. ” “No, I would not dare to buy such a product. There are too many things that have been reconsidered in hindsight, because they appeared to be not as good as they should be. I would only buy it if it had a thorough safety stamp.” “Several conventional cleaning products containing chlorine are also anti-bacterial.” “Yes, but I don’t want to use cleaning products containing chlorine. Water and soap are enough.”
Re-collect the product	
We are now distributing the print-out of the screenshot of a website. Please have a quick look at the print-out. What is your first impression of this website? Would you read the content of such a website? Would you follow the hint on a product package to such a website to find out more about the product?	*The website of a specialty shop provided additional information on the product. The print out mentioned “silver ions that kill 99.99% of all pathogenic bacteria and that are incorporated within the material (no surface layer). Its period of operation is 20 years.”* The print-out generated several spontaneous remarks: “They say that the period of operation is 20 years, but it will become waste, sooner or later. And what happens then with the bacteria?” “If it kills the bacteria, what will it do to your food?”

	"If it kills the pathogenic bacteria, what will it do to the good ones?"
Now take your time to look more carefully at the website. What do you think does the website tell you?	"This information about the silver ions should be explicit on the package. This is much clearer. The on-package information should refer to the anti-bacterial effect, the silver ions and the nano character of the product." "But consumers don't know what nano is, so it does not mean anything if that information is on the package." "At least there should be a possibility to make informed choices". "Many consumers will just buy a chopping board at the moment they need one and they will absolutely not make any effort to read the on-package information. Except, maybe, when large print is used, on the front side."
How valuable do you think the information is to you?	"I don't need this product and this information, but I think it is important that the information is available for others." "But this information is not available when you are in the shop." "In fact, the website does not provide very much information. But it does suggest that the producer wants to address negative feedback from consumers, for example, about the ingredients that do not migrate. Apparently, many consumers have the impression that the ingredients will get into their food."
Would you make an effort to visit such a website to assess about nano chopping boards?	"No, I will not do that for a chopping board!" "I may visit such a website but that depends very much on the product". "I will not buy this chopping board, so I have no reason to visit the website." "No, if I need a new chopping board, I will just go to the shop and buy one." "I may visit such a website if I have a reason to assume that something is wrong with a product or if

	something is completely new."
Would this information influence whether you buy a nano chopping board?	"I don't need a chopping board with an anti-bacterial effect. My chopping boards are made of glass and I am very happy with them. " "Glass can be cleaned very well and there is nothing that can penetrate into it" "I don't want a nano product, because it is very uncertain what might happen with the nano particles. They might migrate into your body or the environment." "The producers appeal to the fear of bacteria. Maybe this is a product that elderly persons will buy, or persons who are extremely concerned about hygiene." "A wooden board can be cleaned very well, using water and salt." "It is important that more information becomes available. Maybe that other people see nano as something that is "hip" or something that has been tested. So, they think it is OK." "This is a typical example of a product that is being pushed by the producer. I simply don't need it, my chopping board is very clean." "Other sources of bacteria, such as the tap, are more important." "When I get diarrhea, it is usually caused by food that I consumed out of my house." "It is not a good idea to make everything sterile." "Maybe I am more concerned about these small particles than about bacteria, but on the other hand, I don't eat chicken anymore, just because of the bacteria."
Re-collect the print out	
As you know, many groups and experts are trying to reach a better informed consumer through product	"The producer is responsible." "It is an interaction between producers and consumers."

information. Who do you think is responsible to assure that a consumer has enough information about products on the market?	"There has to be control over what the producer does. And that control should not be dependent on consumer organizations." "There has to be a kind of control that enables consumers to check whether certain claims are true." "And if certain knowledge is lacking, they should acknowledge that." "It is in the public's interest to have appropriate product information." "But, think about the e numbers on food labels, what can a consumer do with this information?" "Well, that is the personal responsibility of the consumer. If the consumer does not want a nano product, he should be able to make that choice." "If a product is on the market, you may expect as a consumer that it meets certain standards." "Maybe the Advertising Code Committee can do something." "What we need is a kind of dossier that provides information about various aspects of such a product. So, that they can be checked."
And who is most influential when it comes to assure information sufficiency about products on the market?	See above.
Another much debated issue are the environmental impacts of consumer products. Who do you think should be responsible for minimizing the environmental impacts form consumer products?	"What consumers can do is very marginal." "There is a small group of consumers who consider the environmental impacts of a product when they are shopping. The group that takes the environment into account when they dispose of a product is even smaller."
Some argue that consumers should play a greater role in improving the environmental performance of consumer products, their production and disposal.	"It is very difficult for a consumer to make the right choices. For example, I expect that, from an environmental perspective, a wooden chopping board is better than a plastic one, but I might be wrong. And there is no information that can help

Do you agree with this opinion?	me." "Consumer information should be improved significantly." "Yes, but the average consumer does not pay attention to this." "Still there are some small improvements. For instance, consumers are using less plastic bags nowadays." "What you also see is that consumers are very worried about a single product attribute while they almost neglect all kinds of other things. For instance, they don't want a nano chopping board, but they have no worries about any impacts of mobile phones." "Everything can have negative impacts, each product. But you have to explain this and that means that you have to generate too much information. A consumer is unable to process all this information and to assess whether it is appropriate. Hence, this choice has to be made for you." "It is the producer who should prove that the product does not cause any harm. In the past, there were mandatory certificates, such as the Dutch "Kemakeur". As a consumer you should be allowed to assume that a product is safe. But producers are more concerned about their profit than about the environment." "Consumers do play a role, because they can decide to buy it or not." "Yes, but it is extremely complicated to assess whether a product is appropriate." "And it would not be a good idea if a product is allowed on the market and only the more mindful part of the consumers will avoid it, whereas the others assume it is safe. Because then the product will still cause harm." "As far as I am responsible, as a consumer, I need honest information. There should be a quality assurance of the information, provided not by the

	producer but by an independent agency. Because you don't trust the producer."
Finally we would like to know whether you have enjoyed this discussion. Here our number cards will be helpful again. If a ten means that you enjoyed this discussion very much, and a zero that you did not like it at all, which card are you showing us?	Average rating 7.1 in group 1, 7.7 in group 2.
Thanks and Good-buy	

4.3 Overall conclusions nanomaterials

Research approach

Interviewees: The 14 participants had a heterogeneous background in terms of socio-demographics and profession. There were no planned contrasts and there was no obvious characteristic that influenced the answers during the discussion.

Questionnaire: The focus group guideline was an appropriate instrument to get information about the practices and the beliefs of the participants. It should be noted, however, that the number of questions is large and that the questions vary in the level of detail. Because the participants are not aware of this, the facilitator has to be flexible in specifying the focus of the discussion. This flexibility requires that the facilitator knows which topics are crucial for the project as a whole.

The most stimulating parts of the guideline were the questions that enable the participants to tell each other something about their daily practices. Another stimulating part were questions accompanied by a product that they can inspect.

In the case of nanotechnology, the guideline is helpful, but there were several questions that assume more familiarity of the participants with nano products than they had. As a result, there was not

much response to questions about differences between a nano chopping board and a conventional chopping board, and about a friend who wants to buy a nano chopping board or wants to avoid it.

Perception of nanosilver chopping board /nanosilver /nanomaterials /nanotechnology; Knowledge

The introduction was not enough to explain nanomaterials to these participants, because they were not familiar with this topic. The information about small particles did not stimulate the thoughts of the participants, although the term "nano" generated some associations with products, such as cosmetics and socks.

Some participants had associations with stories about applications that might not be completely safe. The under mentioned association was triggered by the question "what comes to your mind if you think about nano-silver chopping boards?" "*There is a paint that was used for boats because it protected them from algae, but it also caused water pollution and it has been banned. That is my association. Nano-silver in a chopping board will be anti-bacterial or anti-pathogenic. I would be somewhat worried about that, because how can the particles be effective if they are completely contained within the board. But maybe I am wrong.*"

Because the participants were not able to say anything about nanomaterials, they focused on those aspects they were more familiar with, in particular, the idea that tiny pieces of wood or plastic may end up in the food and the supposed anti-bacterial effects. However, the participants did not seem to have a clear mental model of the ways in which bacteria grow and how they can be killed. ("*If it kills the bacteria, what will it do to your food?*""*If it kills the pathogenic bacteria, what will it do to the good ones?*")

Most important criteria when buying chopping boards compared to nanosilver chopping boards

There was a mismatch between the attributes of the nano chopping board and the criteria that are important for the participants (i.e. size and type of material). The participants did not mention a bacteria issue when they talked about the main criteria. They were more concerned about the idea that tiny pieces of wood or plastic may end up in the food.

The anti-bacterial effect was not understood and not appreciated. Participants who were concerned about hygiene mentioned other ways to reduce the growth of bacteria (e.g. scrubbing and air-drying). They got the impression that this product was pushed by the producer. In their opinion, it might only be of interest to those persons who are extremely concerned about hygiene.

Labeling/ product information/ websites

The presence of a pure “nano logo” attached to a chopping board did not mean anything to the participants, although it triggered some associations with commercial purposes. It did not mean anything, because they were not familiar with nano materials, and they saw a chopping board as an uncomplicated product, which they replace when needed. Participants who value product information preferred a more complete mention of nano, silver ions, and anti-bacterial effect.

Due to the high Internet penetration in the Netherlands (about 90 %), all participants were familiar with websites that provide product information. They said to use such websites when there is a reason to do that. The reason may be that they want to check something they are worried about or to get more information on something that is novel. Those who didn’t need the product and the information still had the opinion that the information should be available for others.

Responsibility/ Role of actors

The participants had very diverging views on the role of consumers. On the one hand, some participants emphasized that the producer is responsible for information provision and that there should be control over what the producer does. This control should enable consumers to make informed choices and to check whether certain claims are true.

On the other hand, some participants felt that consumers may reasonably expect that any product sold on the market meets certain minimum standards. The producer should prove that the product does not cause any harm. It is very difficult for a consumer to make the right choices and to assess, for example, the environmental merits of alternative products. As consumers are unable to process all the relevant information, those choices have to be made for them.

Participants who acknowledged their responsibility as a consumer emphasized the need for honest information. In their opinion, there should be a quality assurance of the information, provided not by the producer but by an independent agency, because they perceived a fundamental antagonism between consumers and producers.

The participants were very well aware of the differences between consumers. They mentioned a small group of consumers who take the environment into account when they buy a product or dispose of it. In their opinion, it would not be a good idea if a product is allowed on the market and only the more mindful part of the consumers will avoid it, whereas the others assume it is safe. The reason is that then the product will still cause harm.

4.4 GMOs: overview per question

Group 1, May 19, 2011				
	Gender	*Age*	*Level of education*	*Living with children*
P1	Female	34	University	Yes
P2	Female	31	Higher secondary	Yes
P3	Female	42	Higher secondary	Yes
P4	Male	74	University	No
P5	Female	44	Higher secondary	Yes
P6	Female	54	Higher secondary	No

Group 2, June 27, 2011				
	Gender	*Age*	*Level of education*	*Living with children*
P1	Male	32	Lower secondary	Yes
P2	Female	28	University	No
P3	Female	31	Higher secondary	No
P4	Female	48	Higher secondary	Yes
P5	Female	35	University	No
P6	Male	30	University	Yes

Questions	Answers
Introduction by facilitator Self-Introduction of participants A warm-up question related to the topic or the products: Could you please describe whether you use margarine; and, if yes, what is special about your favourite margarine?	*The margarine the participants used to butter bread is often called halvarine, a form of margarine with half the amount of fat that margarine contains. For cooking and baking they used margarine.* *The terms halvarine and margarine were used interchangeably.* Some participants were very keen about the margarine they use, such as diet halvarine. Some also said to prefer margarine from the natural shop, such as soy margarine.

	Some participants said that they just buy the halvarine that is on offer. Some participants buttered their bread with butter. In their view, butter is more tasty and also healthy.
We would now like to talk with you about products related to genetically modified organism (GMO). A GMO is an organism whose genetic material has been altered using genetic engineering techniques. These techniques use DNA molecules from different sources, which are combined to create a new set of genes. This DNA is then transferred into an organism, giving it modified or novel genes. What comes to your mind if you think about GMO products?	- Soybeans, corn; there are also tomatoes, but I don't believe that they are being sold. - I drink soy milk because I am allergic to cow's milk and I remember that there was a lot of turmoil about soy a number of years ago. - I use soy margarine. Another product that comes to my mind is rice. I once was in Thailand and they were very proud of their GM rice. Also tea and corn. - I have heard that there are GMO products on the market in the USA, but I don't know whether there are any GMO products on the market in the Netherlands. - In the USA there are products, sugar if I remember it well, which contain in large print the wording "GM free". You don't see that here. - Diary products, GM cows that produce milk with the same properties as human breast milk.
And what comes to your mind if you think about GM soy?	"I am a vegetarian and I eat a lot of products that contain soy. Sometimes I wonder whether that is a good thing." "Soy is used in fodder making, but I wonder whether GM soy is used for that purpose, because, in principle, GM products are not allowed. But imported soy may be contaminated by GM soy."
And what comes to your mind if you think about GM soy margarine?	"That is something you don't know as a consumer. Well, you can try to find out more about it on Internet or wherever, but it is not stated on the package, that is for sure. As far as I know, it is not allowed to sell GM products here." "May be there is GM soy in my soy margarine. I must admit that I am a "bad" consumer, because I have never checked it, but I can imagine that it is in it. On the other hand, the Netherlands is rather strong in its regulation." "I am more concerned about non-branded products, because brands have to protect their

	reputation." "As far as I know, there is considerable fiddling with soy, whether it has been modified, or contains pesticides. There also has been a lot of cross-breeding." "There is a crucial difference between inserting alien genetic material and traditional breeding methods, using natural qualities."
Now we are interested what importance margarine have for your nutrition.	Margarine is used on a daily basis and it would be missed if it was not there. It has some extra importance for participants with young children.
What are the most important criteria for you if you buy margarine?	- That it is on sale. - That it has no taste. Margarine should not be tasted. - It may have some taste, but it should not be too creamy. - That it is enriched with vitamins. - Low level of hard fat. - Healthy for children. - An appealing package that makes children want to eat it. - Easy to use for cooking and baking. - That it is my favourite taste. - That it is spreadable at low temperature.
You might have heard that there are margarines produced with GM soy on the market. Can you imagine that there is a difference between GM margarine and conventional margarine? Please specify potential differences.	"That is something for producers only; we as consumers should not notice anything particularly different. If it happens, I assume they will mention it in very small print on the back." "What is important to me is which margarine is healthier, but, in my opinion, something that has been "manipulated" would by definition not be healthy." "I feel hesitant about what you hear about GM. If they mention it, they will do that in very small print, but vitamins are identified in large print, so the former has a negative association in contrast to the latter. If GM would become common, I will go to the natural shop to avoid it." "Maybe, they can add more taste." "If there was margarine with the taste of real butter, I would buy it, but if it was GM margarine I

	would feel hesitant to eat it. Yet, I wonder whether that is reasonable, because I cannot imagine that I can take up genetic material that can change my genetic makeup. But still, GM material is scary to me." "Now I'm starting to doubt whether my soy margarine contains GM soy. I remember to have seen something about GM free." "Maybe, GM margarine is cheaper". "Maybe, it contains more pesticide. Because if GM crops use more pesticide than non-GM crops, it will also end up in the product." "The story is more complex than this. Because the question is what the overall consequences will be if you want to kill weeds, without being limited by the desirable plant. But maybe I am making too much of it." "What is bothering me is that a large company can own patents on genetically manipulated plants. What nature gives us for food should not be the property of a private company. As a result, the food becomes instantly unnatural to me, because it must have been created in an artificial way." "I must say that I am also somewhat critical of this issue. I should not buy it because I am afraid that it becomes uncontrollable. But to be honest, I also have the opinion that we need this technology to feed all the people on earth. So, theoretically I am against it; I am particularly worried about the long-term effects." "What I want to add to my earlier remark is that I am worried about the effects of GM on the plants that are available to our descendants." The participants did not always make a proper distinction between "modified" and "genetically modified". "When I think about the potential consequences for

	our offspring and things like that, I have a good reason to be against it. But maybe I am just a stupid consumer; if it tastes good and it is available on the shelves, than it is OK for me. I was eating American peanut butter the other day and some guy asked me whether I knew that it was modified. They removed the peanut oil and replaced it with another oil. That gave me mixed feelings; I liked the taste very much, but it was, in one way or another, artificial and different from how peanut butter should be."
What importance do the criteria that you have named for you if you buy margarine? A rather great importance or rather minor importance?	See above. Some participants were very keen about the margarine they use (no taste, enriched with vitamins, healthy for children). Some participants said that they just buy a product that is on offer.
If you imagine you are inside the head of your friend: What do you feel is their most important reason why they want to buy a GMO margarine?	The participants had no clear image of reasons to buy a GMO margarine, but some of them took a broader approach and opposed the participants who buy from the natural shop. "You should put this issue in a broader perspective. There should be enough food for the whole world population. That can make it necessary to modify crops to prevent farmers from using more pesticides to try to keep food production up with demand. It is, in fact, a very complicated choice. It is also a question whether it is a good idea to want only organic food. Lately, it has been in the news that organic farms are not much better for nature than conventional ones and that they need a greater area of land to deliver the same output, at the expense of nature. So, everything has to have a trade-off. That makes it extremely complicated." "Organic food may also contain more bacteria. I doubt whether it is healthier." "The issue is difficult to resolve. On the one hand, you hear organic is better, on the other hand they say that it is not possible to feed a large number of people in this way. For a layperson it is difficult to draw a conclusion. If you knew that the world cannot do without GMO food, and you would think

	it is healthier because it uses less pesticide, and it may be cheaper, you would buy it."
Now imagine you are inside the head of another of your friends who wants to avoid buying a GMO margarine. What do you feel is their most important reason why they want to avoid a GMO margarine?	In particular, the users of organic food gave some response to this question. "Apart from the fact that it has been genetically modified, they often use more pesticide. Therefore, I prefer organic food. Even organic vegetables have to be washed carefully, but they may be somewhat healthier and more environmentally friendly." "The reason why they present in large print the wording "GM free" in the USA is that people don't want to ingest it." "In my opinion, GMO margarine is not dangerous for human beings, but I am worried about the impacts of GM on other crops, such as organic crops. "
We are now distributing a margarine to each [pair of] you. Is there anything about this that catches your attention?	*The first product was a package of halvarine with the label "produced without gene technology" (in Dutch, attached by the researchers).* The participants inspected the product silently.
Have you seen this label before?	The participants had not seen this label before. "I have never seen this label before, but I remember soy products offered by the natural shop, which contained the statement that the product was manufactured from soy that has not been genetically modified."
What do you think does this label tell you?	See above.
Would this label influence whether you buy a margarine?	In particular, the users of organic food said that the label appeals to positive emotions or gives a feeling of safety and reassurance. "If I saw such a label, I would feel safer." "I notice by myself that I am quite sensitive to these kind of things. I don't believe the "ik kies bewust" logo (Dutch "healthy choice" front-of-pack label), but in other countries, such as the UK, they give far more extended product information, for instance,

	whether it is vegetarian. Such information makes me believe that it is a better product." "This gives me a feeling of security and confidence. Because the problem is not so much the technology, but the fact that you, as a consumer, do not know in which products it can be found." Others did not know whether this label would influence their behaviour.
Recollect the product	
We are now showing another margarine to each pair of you. Is there anything special/conspicuous about this product?	*The second product was a package of halvarine, which provides a list of ingredients and the statement "containing genetically modified soy".* The participants recognized the discount brand (Euro Shopper), but they were surprised that this was a GM product and that it was on sale in the large supermarket chain (Albert Heijn) covering close to 33% of the entire food market in the Netherlands. "I really thought that it is not allowed to sell these products."
Have you seen this kind of information before?	"This is something that you normally don't read. In particular, consumers who use to buy Euro Shopper will not read this information." "I am wondering now whether this statement also applies to other margarines that Albert Heijn offers." "Maybe it is also used in other margarines."
What do you think does this information tell you?	See above.
Would this information influence whether you buy a margarine?	The participants reported that they would not notice this information. "I cannot read this small print in the supermarket, without reading spectacles, but I would not buy the product if I could read it." "No influence. How many people will look at the

	ingredients of margarine? You assume that halvarine is plant-based and what you want to know is specific information on vitamins. That is also how producers want to position their product." "I would buy it, but without regarding the information, just because I am not loyal to any brand. The next time I will buy something else." "If there is choice and I don't have to buy it, I would prefer not to." "The funny thing is, the label that it contains GM gives me the same feeling of safety as the label that it is GM free. The fact that it is mentioned means that it has been tested and checked, and that there is an agency that approves it. Thus, if it is indicated on the package, I also feel confident about it and think it is OK." "I do remember now that I have seen this statement on another product and that I thought hey." "I would want to know who is responsible for the label, because I am always cynical about labels. We just have to trust that the label is correct. But it happens often that things appear to be different from what they expected. For example, that something is believed to be healthy but is not."
Recollect the product	
We are now distributing the print-out of the screenshot of a website. Please have a quick look at the print-out. What is your first impression of this website? Would you read the content of such a website? Would you follow the hint on a product package to such a website to find out more about the product?	*The print-out is a page from GMO compass (Overview: Foods, Genetic Engineering, and Labelling, which describes common ingredients that could be produced with genetic engineering, and labelling requirements), translated by Google into Dutch.* The participants mentioned that they sometimes use a website to find out more about a product, but not in response to a hint on a product package. "Even if I would notice the hint, I would forget it." "It also depends on the number of products. If the number of GM products grows, there will be more

	news about their safety and then I may visit such a website to find out more about it."
Now take your time to look more carefully at the website. What do you think does the website tell you?	See above.
How valuable do you think the information is to you?	"A website can be useful as an additional and complementary source of information to a product package, but it is not enough." "For me, it is an important question who is behind this site? With regard to food I am always very suspicious. Is the producer the source of the information or is it some group who wants us to turn back to become hunters-gatherers again?" "As a consumer I find it very difficult to assess whether I can trust the information." "Yes, each organization has its own agenda and that also applies to governmental agencies, such as the Netherlands Nutrition Centre." "I remember how the government wanted to increase the consumption of milk, simply because there was an overproduction."
Would you make an effort to visit such a website to assess about GM soy?	"I may use a website when I am curious what the label "produced without gene technology" means." "It strongly depends on what you are interested in. You can check E-numbers in the supermarket if you have iPhone; then you see something you are interested in and you can check it immediately. That is different from just visiting a website." "If GMO is a hot item, I may use a website to find out more about it, but if it is not hot, my interest is too low." "I am very ambivalent about soy, but I did not visit a website to find out more about it. I do eat soy but I have the idea in the back of my head that it has several drawbacks. In fact, I do not know what to think about it."

	"Soy and soy products are in almost every packaged food."
Would this information influence whether you buy GMO margarine?	"The real problem is that we don't know what we eat, there is too much processing of food, therefore, it is better to eat as pure as possible. "Well, I wonder what that means. How do you know whether something is healthy for you and not manipulated?" "The supermarket Albert Heijn also uses a special "pure and fair" label. If you buy a product with such a label, you feel that you are doing something right." "Think about all the warning labels on cigarettes. That does not work. Certain products should not be on the market."
Recollect the print out.	
As you know, many groups and experts are trying to reach a better informed consumer through product information. Who do you think is responsible to assure that a consumer has enough information about products on the market?	"The government is responsible, because companies care primarily about maximizing their markets. We don't have much choice in the Netherlands; there are only a few supermarket chains." "That should be organized at the European level, because companies are also organized at that level." "As consumers, we are also responsible, but to a lesser degree. And many people don't take that seriously. If you see what consumers buy and that they only care about prices, you wonder why they do that." "I don't think that I, as a consumer, should be constantly mindful of how to make the right choices. There are simply too many wrong choices that you can make. Producers should not be allowed to evade their responsibility by putting a label on a product." "Yes, but it is we who do it. We choose cheap products, such as low-priced meat. And soy, in particular GM soy, is needed to feed the animals.

	This is all related. Therefore, the government should try to reduce meat consumption." "In my view, the shop is responsible, because that is the point where it all comes together." "As I see it, the government is responsible to make the rules about which information should be available. And the producer is responsible to make that information available, because there is no government that can oversee what is happening in all the international food chains. So, it is a shared responsibility and a civil society organization, such as a consumer union, should safeguard consumer interests." "Everybody has responsibility; each participant in the chain has its own responsibility." "The government should define the lines and the producers are responsible for meeting the requirements. Consumer organizations are useful, but not really responsible." "But what about the amount of information. This list of ingredients still leaves open what kind of oil has been used. So, the question remains which information is essential for us."
And who is most influential when it comes to assure information sufficiency about products on the market?	See above.
Another much debated issue are the negative impacts of consumer products. Who do you think should be responsible for minimizing the negative impacts from consumer products?	"I only use a very small amount of margarine to butter three slices of bread." "Each of us has a certain responsibility. But many consumers are rather passive when it comes to using the information that is already available." "But what is it that I can do? Do I have to go to the shop and ask the shop owner how the food has been produced? Is that what you mean with becoming active?" "In fact, we are all invited to be passive; you can be passive. We all have more important things to do."

	"I am well willing to take the label into account, but not more than that. And even the labels are not always so good. I have heard some critical remarks about them but I am not the kind of person who dives into this issue." "It is difficult for an individual to make trade-offs. Again and again, there is something new. And the government also cares about other interests than my interest as consumer. But, if GM products caused adverse health effects, the government would act." "There is a difference between short- term and long-term health effects. It is too early to say something about the long-term effects. Take the example of smoking and lung cancer." "What is worrying me is that the big companies will, on the one hand, think about their social responsibilities, but, on the other hand, attend to their commercial pursuits."
Some argue that consumers should play a greater role in improving the environmental performance of consumer products, their production and disposal. Do you agree with this opinion?	"I don't go to the natural shop, because that is too expensive. So, I go to the supermarket." "You are not aware of it when you are walking through the supermarket." "This depends on whether you can trust the information that is on the package." "I have heard that in Germany there is much more control on food issues and that they also offer more on-package information. How much control there is with regard to GM I don't know. But the fact that there is more information on the package gives you the impression that there is more control." "It would be nice if the government and the producers took more responsibility and only provided products that are good. That would be more efficient than that everybody has to read the labels." "It is also a matter of volume. As long as people are allowed to buy cheap stuff and plenty of it, they will do that. The government should play a role in

	raising awareness that this cannot go on." "The example of smoking suggests that you can reduce the consumption of certain products by socially disapproving of it enough."
Finally we would like to know whether you have enjoyed this discussion. Here our number cards will be helpful again. If a ten means that you enjoyed this discussion very much, and a zero that you did not like it at all, which card are you showing us?	Average rating 8 in group 1, 8 in group 2.
Thanks and Good-buy	

4.5 Overall conclusions GMOs

Research approach

Interviewees: The 12 participants had a heterogeneous background in terms of socio-demographics and profession. During the discussion it appeared that there were salient differences of opinion between persons with different degrees of sympathy for organic food. This happened in both groups but it was not a planned contrast.

Questionnaire: The focus group guideline was almost the same as the one on nanotechnology. Again, it can be concluded that it is, in principle, an appropriate instrument to get information about the practices and the beliefs of the participants. It should be noted that the number of questions is large and that the questions vary in the level of detail. Because the participants are not aware of this, the facilitator has to be flexible in specifying the focus of the discussion. This flexibility requires that the facilitator knows which topics are crucial for the project as a whole.

Again, the most stimulating parts of the guideline were the questions that enable the participants to tell each other something about their daily practices. Another stimulating part were questions accompanied by a product that they can inspect.

In the case of GM, the participants were able to answer most of the questions. Yet, they did not always make a proper distinction between “modified” and “genetically modified”. Both terms can also be found on packages and may cause confusion.

Perception of GM products / GM soy / GM margarine; Knowledge

The introduction was not enough to explain GM to the participants, but they took the technical definition for granted. They were familiar with the notion of GM and they had associations with a number of products, including GM soy.

The associations with GM products triggered the cultural divide between those participants who had a preference for organic food and those who preferred conventional food. As a result, they did not discuss the topic of GM as such, but put more emphasis on some broader aspects of GM agriculture, in particular the use of pesticide and to a lesser extent the role of patents and big companies. “*What is bothering me is that a large company can own patents on genetically manipulated plants. What nature gives us for food should not be the property of a private company. As a result, the food becomes instantly unnatural to me, because it must have been created in an artificial way*.”

In response to this type of statements, the participants who did not have a preference for organic food also paid attention to the global food situation. “*You should put this issue in a broader perspective. There should be enough food for the whole world population. That can make it necessary to modify crops to prevent farmers from using more pesticides to try to keep food production up with demand. It is, in fact, a very complicated choice. It is also a question whether it is a good idea to want only organic food. Lately, it has been in the news that organic farms are not much better for nature than conventional ones and that they need a greater area of land to deliver the same output, at the expense of nature. So, everything has to have a trade-off. That makes it extremely complicated*.”

Most important criteria when buying margarine compared to GM margarine

The participants demonstrated different levels of involvement with the product of margarine. Some participants were very keen about the margarine they use (no taste, enriched with vitamins, healthy for children). Some said that they just buy a product that is on offer. Some buttered their bread with butter.

Initially, the participants were not aware of the fact that they could buy GM margarine. This may explain that they did not see a relationship between this product and the most important criteria when buying margarine. However, during inspection of the GM product, they noticed that it might be interesting for buyers of discount brands.

Labeling/ product information/ websites

The participants indicated to appreciate more transparency on the use of GM. The users of organic food said that the "produced without gene technology" label appeals to positive emotions or gives a feeling of safety and reassurance. In general, the "containing genetically modified soy" label did cause some surprise. Offering more on-package information was seen as a cue that there is more control on products. "*The funny thing is, the label that it contains GM gives me the same feeling of safety as the label that it is GM free. The fact that it is mentioned means that it has been tested and checked, and that there is an agency that approves it. Thus, if it is indicated on the package, I also feel confident about it and think it is OK.*"

But the participants also reported that, under normal circumstances, they would not notice the "containing genetically modified soy" statement. They cannot read this small print in the supermarket, they do not expect this information and they are not interested in all the ingredients of margarine. "() *You assume that halvarine is plant-based and what you want to know is specific information on vitamins.*"

Just like the nano groups, the participants were familiar with websites that provide product information. They mentioned that they sometimes use a website to find out more about a product, but not in response to a hint on a product package. It depends on their level of interest in an issue and their trust in sources of information. "() *With regard to food I am always very suspicious. Is the producer the source of the information or is it some group who wants us to turn back to become hunters-gatherers again?*"

Another point is that a website may not help to reduce complexity and ambivalence. "*I am very ambivalent about soy, but I did not visit a website to find out more about it. I do eat soy but I have the idea in the back of my head that it has several drawbacks. In fact, I do not know what to think about it.*"

Responsibility/ Role of actors

The cultural divide between those participants who had a preference for organic food and those who preferred conventional food was also revealed by their opinions on responsibility. The former attributed more responsibility to themselves than the latter. Implicitly, the former expressed the moral ideal of "the independent consumer" who is uncontrolled by the commercial market. The high standards of this ideal, which has been cultivated by the natural foods movement, may explain feelings of failure ("*I must admit that I am a "bad" consumer*") and being overburdened ("*I don't think that I, as a consumer, should be constantly mindful of how to make the right choices. There are simply too many wrong choices that you can make.*"). The conventional participants were less bothered by such concerns ("*If it tastes good and it is available on the shelves, than it is OK for me*").

A closely related theme is that the natural foods movement sees more connections between the health of people and the health of other organisms than conventional consumers do. This may account for the way the participants referred to the use of pesticides as a threat to their own health and to the plants that are available to their descendants. ("*Apart from the fact that it has been genetically modified, they often use more pesticide. Therefore, I prefer organic food. Even organic vegetables have to be washed carefully, but they may be somewhat healthier and more environmentally friendly.*") Again, the conventional participants were less bothered by such concerns ("*If GM products caused adverse health effects, the government would act*").

In the case of food production, the notion of a chain may be more prominent than in the case of other products. This may explain that references were made to shared responsibility and to the responsibility of each participant in the chain. Yet, certain statements were also strongly influenced by perceived antagonism between producers ("*companies care primarily about maximizing their markets*"), governments (*the government also cares about other interests than my interest as consumer*") and consumers ('*we all have more important things to do*").

In general, the participants were broadly aware of the complexities related to food production and consumption. Yet, they also said not to be aware of it when they are walking through the supermarket.

4.6 Comparing nano and gmo answers

Preliminary remarks

In both cases the focus groups addressed food-related topics. Therefore, the answers should be seen in the context of food-related practices in the Netherlands. A crucial point is that the country has a small internal market. Economists have shown that countries with small internal markets can only increase their welfare in the modern world by creating an open economy[17]. This is what the Netherlands has done. In matters of food it is also relevant that the Netherlands is one of the countries with a low degree of national culinary self-consciousness[18]. It has a highly industrialized food industry and food retail is very structured; large supermarkets provide conventional and organic

[17] Alesina, A. & Wacziarg, R. (1998). Openness, country size and government. *Journal of Public Economics, 69*, 305-321.
[18] DeSoucey, M. (2010). Gastronationalism: Food traditions and authenticity politics in the European Union. *American Sociological Review, 75*, 432-455.

foods side by side. Overall, Dutch consumers spend a relatively small percentage of their household budget on food[19].

Research approach

The focus group guideline was an appropriate instrument to get information about the practices and the beliefs of the participants. However, the facilitator had to be flexible in specifying the focus of the discussion, because the number of questions is large and they also vary in the level of detail. Just asking the questions one after another may cause irritation and confusion among the participants. The flexibility requires that the facilitator knows which topics are crucial for the project as a whole.

It should be noted that the participants were rather unfamiliar with the technological issues and that they had no experience with the focal products on the market. This means that they had never considered buying anyone of the focal products. Although the focus group guideline could be used in these cases, its potential as an instrument to reveal consumer practices and beliefs was not fully realized.

The role of issue familiarity

In the case of nanotechnology, the participants had to discuss an issue they were unfamiliar with in combination with a low-involvement product. Because the participants were not able to say anything about nanomaterials, they focused on those aspects of the topic they were more familiar with, in particular, the idea that tiny pieces of a chopping board may end up in the food and the supposed anti-bacterial effects. However, there was not much response to several of the questions.

Although margarine is not really a high-involvement product, it is more related to taste and health than a chopping board. Moreover, GM was somewhat more familiar than nanotechnology. This difference had several consequences. When people talk about familiar issues, they are more inclined to confirm their existing beliefs. In the case of GM, the issue triggered the cultural divide between organic and conventional consumers. This may require some explanation.

Ideas around organic farming developed in German and English speaking countries about a century ago, when they were undergoing similar changes in the food system[20]. In Germany it was part of an influential movement that became known as the Lebensreform; the Netherlands, the United

[19] de Boer, J., Helms, M., & Aiking, H. (2006). Protein consumption and sustainability: Diet diversity in EU-15. *Ecological Economics, 59*, 267-274.
[20] Vogt, G. (2007). The origins of organic farming. In W. Lockeretz (Ed.), *Organic farming: An international history* (pp. 9-29). Oxfordshire: CAB International.

Kingdom and the United States also had reform movements. The movements have cultivated specific beliefs about human relationship with nature and the responsibility of consumers.

With regard to nature, organic consumers are motivated to avoid errors in dealing with natural processes and living organisms, including themselves[21]. They use an implicit ordering of potentially error-prone human interventions in a living organism, which ranges from synthetically produced chemicals, via GM to conventional interventions. This ordering may explain that the participants were in fact more concerned about synthetic pesticides than about GM as such.

Sensitivity to the notion of synthetically produced chemicals may also be relevant in the context of discussions on nanomaterials, which can be distinguished into natural and manmade. However, this distinction was not made in the present study. The implicit ordering of human interventions might account for the observation that some participants were more worried about small particles in their food than about bacteria that can be removed by scrubbing and air-drying.

The reform movements also cultivated the ideal of "the independent consumer" who is uncontrolled by the commercial market[22]. This ideal may give rise to an individualistic understanding of one's responsibility as consumer, resulting in high moral standards and worries about making wrong choices. Indeed, those participants who were most inclined to make responsible choices were also the most worried about failing.

The conventional consumers were less involved in matters of food and less worried about their role as consumer. In the focus group context, some of them were inclined to defend GM in terms of global food issues. Hence, issue familiarity had important consequences on multiple dimensions and created more discussion between the participants.

Product attributes

In both cases the participants had no experience with the focal products on the market, nor did they knew about others' experiences. Also, there was no match between the perceived attributes of the focal product and the criteria the participants used in making their buying decisions. As mentioned before, this was the main reason why the potential of the focus group guideline to reveal consumer practices and beliefs was not fully realized.

[21] de Boer, J. (2010). The role of prevention-oriented attitudes towards nature in people's judgment of new applications of genomics techniques in soil ecology. *Public Understanding of Science, 19* (6), 654-668.
[22] Gusfield, J. R. (1992). Nature's body and the metaphors of food. In M. Lamont & M. Fournier (Eds.), *Cultivating differences: symbolic boundaries and the making of inequality* (pp. 75-103). Chicago: The University of Chicago Press.

It should be noted that the focal products were not overall rejected. It was suggested that the nanosilver chopping board might be interesting for a niche market of persons who are extremely concerned about hygiene. The GM margarine was sold as a discount brand whose buyers tend to be unaware of the ingredients.

Information use

In both cases the focal products did generate some amazement, but no strong need for information. The participants did not explicitly elaborate on ethical issues, such as freedom of choice, but there were some hints in that direction. They indicated to appreciate more transparency on the use of GM and nanotechnology in the products. However, a pure “nano logo” was considered meaningless or only relevant for commercial use. Although they reported that, under normal circumstances, they would not notice all the labels, offering more on-package information was seen as a cue that there is more control on the products.

In both cases the participants were, in principle, sympathetic to the use of websites to provide product information, but not as a replacement of on-package information. Those who didn’t need the product and the information still had the opinion that the information should be available for others. However, the participants expressed strong concern about the sources of information. It was considered difficult for consumers to assess whether they can trust the information.

Responsibilities

In both cases the questions on responsibilities resulted in fairly predictable general answers about producers, governments and consumers. However, there were some differences that can be attributed to perceived antagonism (i.e. belief in the existence of opposed interests and goals). In the perception of consumers, GM may be more associated with big companies than nanotechnology. In addition, food is a market issue in which the government plays different roles for producers and consumers. The participants were also well aware of the differences between consumers.

The questions did not specifically ask the participants to identify areas where they can and should act themselves. Tentatively, it can be said that consumer responsibilities were delimited by a lower and an upper level. The lower level builds on expectations that any product sold on the market should meet certain minimum standards. The producer should prove that the product does not cause any harm. The upper level should meet individual needs for more transparency through honest product information and a quality assurance of the information, provided by an independent agency. It was also mentioned that the difference between lower and an upper level should not become too large.